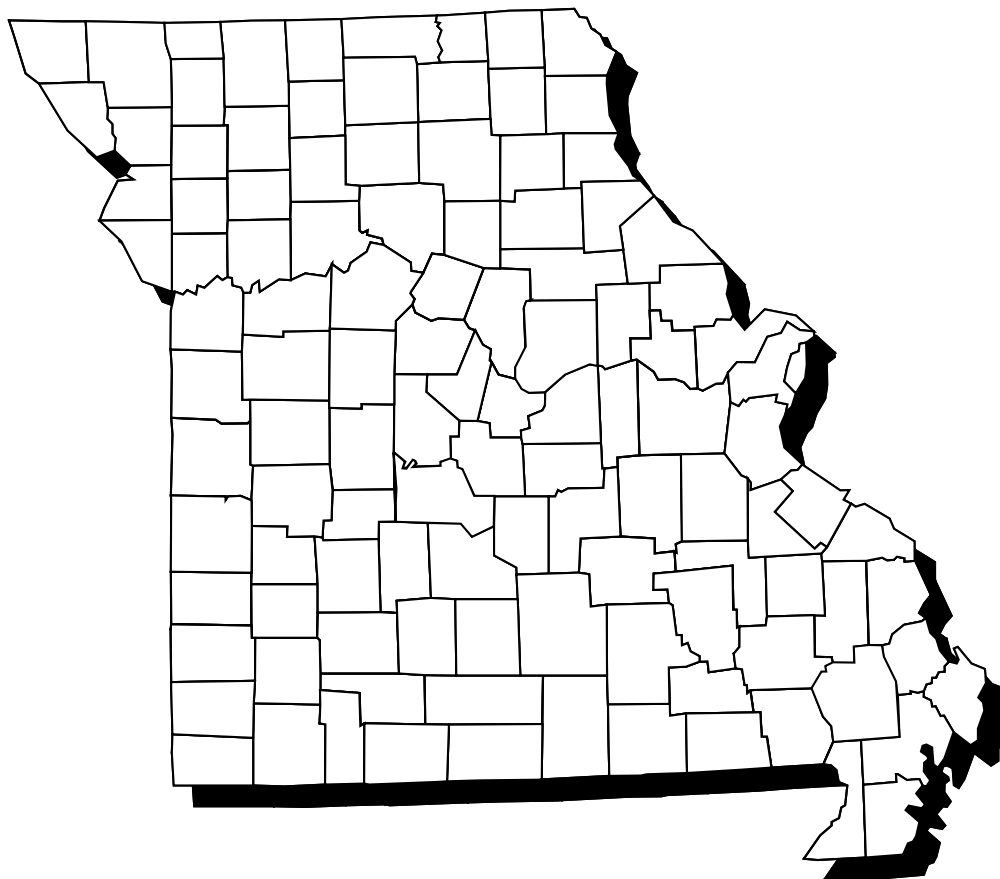


State of Missouri Toxics Release Inventory

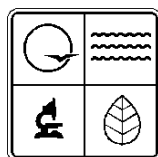


Annual Report: 1997 Data

(Data reported to EPA July 1, 1998)

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**STATE OF MISSOURI
TOXICS RELEASE INVENTORY**

ANNUAL REPORT: 1997 Data

EXECUTIVE SUMMARY

The following Annual Report summarizes the Toxics Release Inventory (TRI) reports submitted to the United States Environmental Protection Agency (EPA) and to the Missouri Department of Natural Resources (DNR) under the Emergency Planning and Community Right-to-Know Act of 1986. This is the first TRI Annual Report published in Missouri. The data submitted identifies total chemical releases and transfers by manufacturing industries throughout Missouri. The report reviews the data for the 1997 reporting year and trends for the years 1988 through 1997. The report also evaluates what companies have done to reduce pollution through the various methods of source reduction.

Summary of 1997 TRI Data

In 1997, a total of 553 facilities reported releasing 57,291,332 pounds of toxic chemicals to the air, land or water in Missouri. By media, they reported releasing 33,788,155 pounds to the air (59.0 %); 20,171,157 pounds to the land (35.2 %); and 3,332,020 pounds to the water (5.8%).

Top Industries

Three industry sectors reported the major portion, 76.6 percent, of these releases. These industries were

Primary Metal Products	36.7 %
Chemical and Allied Products	26.5 %
Transportation Equipment	13.4 %

Top Companies

Individual companies in these industries that contributed greater than one million pounds of releases in Missouri were

<u>Primary Metal Products:</u>	<u>Mil. lbs.</u>
Asarco, Inc.	10.9
Doe Run Co.	8.7

Chemical and Allied Products:

Royal Oak Enterprises	3.3
Craig Industries	2.7
Missouri Chemical Works	1.8

Transportation Equipment:

Ford Motor Co. (Claycomo)	2.5
Ford Motor Co. (Hazelwood)	1.2

Top Chemicals

Twelve chemicals had reported releases of greater than one million pounds each. These 12 chemicals accounted for 48,083,896 pounds, or 83.9 percent of the total. The top five of these 12 chemicals were

	<u>Mil. lbs.</u>
Zinc and Zinc Compounds	14.4
Methanol	10.0
Lead and Lead Compounds	5.0
Xylene	4.4
Nitrate Compounds	2.9

Largest Releases by County

Approximately 20 counties in Missouri had releases greater than 500,000 pounds. The counties of Iron and Jefferson each had over 10 million pounds. These are the counties where the large smelting companies of Doe Run and Asarco are located. The counties of Dent, Carter, Shannon and Texas had relatively large releases because they are the counties where the larger charcoal manufacturers are located. Other counties that showed high releases are those in which large metropolitan cities are located.

Missouri TRI Trends 1988 – 1997

Since 1988, the total annual releases in Missouri have decreased by 40,311,094 pounds, or 41.3 percent. In 1994 the annual TRI releases reached a low of 48,487,689 pounds. However, since 1994, there has been an increase of 8,803,643, or 18.2 percent.

This increase has been due primarily to the addition of 286 reportable chemicals and chemical categories in 1995, and the addition of the charcoal industry in 1996, which greatly increased the amount of methanol reported.

Largest Chemical Changes

Since 1988, 13 chemicals showed a decrease of over one million pounds. The top five chemicals and their decreases were

	<u>Mil. lbs.</u>
Zinc and Zinc Compounds	15.9
Xylene	6.7
Toluene	4.3
1,1,1-Trichloroethane	3.8
Lead and Lead Compounds	3.1

The most significant changes were with 1,1,1-trichloroethane and freon 113, because the releases of these two chemicals have almost been eliminated.

Only two chemicals showed increases close to or greater than one million pounds since 1988. They were styrene (957,797 pounds increase) and methanol (6,823,955 pounds increase). The styrene increase was due to a greater number of companies now reporting styrene. And the methanol increase was due to the charcoal industry being added in 1996.

Largest Changes in Releases

Many companies in Missouri have reported significant decreases in their annual releases since 1988 (largest reductions), and several have essentially eliminated their releases (largest percent reductions). The top three companies in each of these categories are listed as follows:

Largest Reductions

<u>Company</u>	<u>Mil. lbs.</u>	<u>Percent</u>
Doe Run Co.,	20.1	69.8
3M, Nevada	2.8	75.5
Chrysler Corp.	2.4	83.3

Largest Percent Reductions

<u>Company</u>	<u>Mil. lbs.</u>	<u>Percent</u>
Canon Steel Corp.	0.7	100
North American Refrac.	0.6	100
Crane National Vendors	0.3	100

Approximately 20 companies showed significant increases in their total annual releases since 1988. The top three companies and their increases were

	<u>Mil. lbs.</u>	<u>Percent</u>
Missouri Chem. Works	1.1	136
Ford Motor Co.	0.9	61
Silgan Containers	0.7	17793

For more details on these decreases and increases see the Trends Analysis section of this report.

Source Reduction

Source reduction is described as any activity that reduces the amount of a hazardous substance from entering a waste stream or otherwise being released to the environment. Information concerning source reduction has been reported to the TRI since 1991.

In 1997, companies reported managing a total of 560,632,347 pounds of TRI chemical wastes. Of this, 71.1 percent (390,562,754 pounds) was managed on-site for recycling, energy recovery or treatment, 17.9 percent (100,554,0987 pounds) was sent off-site for the same purposes and 11.0 percent (61,515,495 pounds) was either released to the environment or transferred off-site for disposal.

In 1997, 108 companies reported some type of source reduction activity. This was 19.5 percent of the 553 companies that filed TRI reports in 1997.

The source reduction methods companies reported using most included: improved operating procedures, spill and leak prevention and substitution of raw materials.

Since 1991, Missouri companies have reported reducing the amount of on-site releases and off-site transfers for disposal by 10.2 percent or 6,954,598 pounds. Based on the data provided and changes in reporting requirements, it could not be concluded that the amount of total wastes managed have decreased. However, greater percentages of wastes are being managed through more environmentally preferable methods such as source reduction, recycling and energy recovery.

Table of Contents

INTRODUCTION.....	1
THE TOXIC RELEASE INVENTORY	2
What is it?	2
Who Must Report?	2
How and When is The TRI Reported?	2
Source Reduction	3
How can the TRI be Used?	3
Limitations	4
Availability.....	4
CHANGES AND INITIATIVES.....	5
New Industries.....	5
Chemical Changes.....	5
Phase III – Materials Accounting.....	6
New Initiatives	6
MISSOURI 1997 TRI RESULTS	8
TRI Releases by Environmental Media	8
TRI Releases by Industry Sector.....	8
TRI Releases by Chemical	8
Top Twelve TRI Chemicals:	11
Uses and Hazards	11
TRI Releases by County.....	22
TRI Releases by Company.....	22
TRENDS ANALYSIS – 1988 to 1997	26
Statewide Trends 1988 - 1997.....	26
Chemical Trends 1988 - 1997	28
Company Trends 1988-1997	30
SOURCE REDUCTION IN MISSOURI.....	34
Source Reduction Quantities	34
Source Reduction Methods	35
Source Reduction Trends	37
Source Reduction Method Trends.....	40
SUMMARY	42

Index of Tables

TABLE I – Changes to the Toxic Release Inventory 1987 - 1998	7
TABLE 2 – TRI Releases by Media and by Industry Sector – 1997 Data	10
TABLE 3 – Releases of top 12 Chemicals.....	11
TABLE 4 – Largest Releases of Lead and Zinc in 1997	12
TABLE 5 – Companies Reporting Largest Releases of Methanol in 1997	14
TABLE 6 – Companies Reporting Largest Releases of Xylene in 1997	14
TABLE 7 – Companies Reporting Largest Reduction of Xylene Since 1988 to 1997.....	14
TABLE 8 – Companies Reporting Largest Releases of Nitrate Compounds in 1997	15
TABLE 9 – Companies Reporting Largest Releases of Toluene, MEK and MIBK for 1997.....	17
TABLE 9a – Industries Reporting Largest Releases of Toluene, MEK and MIBK for 1997	17
TABLE 10 – Changes in Toluene, MEK and MIBK Releases Since 1988.....	17
TABLE 11 – Companies Reporting Largest Releases of n-Hexane in 1997	18
TABLE 12 – Largest Reductions in n-Hexane Releases, 1995 to 1997	18
TABLE 13 – Companies Reporting Largest Releases of Glycol Ethers in 1997	19
TABLE 14 – Companies Reporting Largest Reductions of Glycol Ethers, 1988 to 1997	19
TABLE 15 – Companies Reporting Greatest Percentage of Ammonia Releases in 1997.....	20
TABLE 16 – Largest Changes in Reported Ammonia – 1988 to 1997	20
TABLE 17 – Companies Showing Largest Reported Releases of Styrene in 1997	21
TABLE 18 – Top 30 Companies Reporting Greatest Annual Releases – 1997	23
TABLE 19 – Total Releases by Media by Year.....	28
TABLE 20 – Chemicals Showing Greatest Reductions, 1988 Through 1997.....	29
TABLE 21 – Chemicals Showing Greatest Increases, 1988 Through 1997.....	29
TABLE 22 - Top 30 Companies Showing Largest Volume Reductions, 1988 Through 1997*	31
TABLE 23 - Companies Showing Largest Percent Reductions, 1988 Through 1997*	32
TABLE 24 - Companies Showing Largest Total Increases 1988 Through 1997*	33
TABLE 25 - Current and Projected Quantities of TRI Chemicals Managed as Wastes 1997 – 1999.....	36
TABLE 26 - Most Frequently Reported Activity Codes – 1997	37
TABLE 27 - Total Wastes Managed by Year as Reported in Section 8 of the TRI	39
TABLE 28 – Source Reduction Method Trends.....	41
TABLE 29 – Top 12 Source Reduction Activity Codes Reported for all Years, 1991 – 1997.....	41

Index of Figures

Figure 1. 1997 Releases by Industry Sector-----	8
Figure 2. Top 10 Industry Sectors -----	9
Figure 3. Number of Companies and Industries Reporting Releases of Toluene, MEK and MIBK-----	16
Figure 4. 1997 TRI Releases by County-----	24
Figure 5. Twelve Counties Showing Highest Releases for 1997 -----	25
Figure 6. Total TRI Releases 1988 to 1997 -----	26
Figure 7. Total TRI Releases by Media – 1988 to 1997 -----	27
Figure 8. Waste Management Hierarchy -----	36

List of Appendices

A	Toxic Chemical Release Inventory Reporting Form
B	Standard Industrial Classification Codes
C	Chemical Releases Sorted in Descending Order for Reporting Year 1997
D	Common Uses of Toxic Chemicals and Their Potential Hazards
E	Companies Showing Largest Reductions of On-Site Releases, 1998 Through 1997
F	Total TRI Releases by County
G	Source Reduction Activity Codes

INTRODUCTION

On Oct. 17, 1986, Congress enacted the Emergency Planning Community Right-to-Know Act (EPCRA) into federal law. The intent of EPCRA was to help citizens deal safely and effectively with hazardous chemicals in their communities. It required manufacturers and businesses, as well as government agencies that managed or used hazardous chemicals to report the location and quantities of these chemicals. The law established local emergency planning committees (LEPC's) and state emergency response commissions (SERC's) that would use this information to better plan for chemical emergencies in the local communities. The law also required manufacturing companies, that routinely released quantities of chemicals to the air, land, or water during their manufacturing processes to report these amounts to the Environmental Protection Agency (EPA) and to the state. The purpose was so communities could know what chemical hazards they were being exposed to on a routine basis. It is this latter requirement that created the Toxics Release Inventory (TRI).

The following Annual Report is intended to provide an overview of what the TRI is, how it can be used, the changes that have affected it in the past and how it will change in the future.

This report will also review the TRI data for the 1997 reporting year, which is the most recent data available. It will review industries and companies that reported the greatest releases of TRI chemicals, as well as those that have reported the greatest reductions. It will look at the top chemicals reported in Missouri and where these chemical releases were reported by county.

The report will then examine various trends. It is important to review the largest reported releases in a given year, but it is also important to look at how these reported releases are changing over time. Trends will be looked at statewide, by chemical and by company.

Finally, the TRI Annual Report will review the topic of source reduction. Source reduction is described as any activity that reduces the generation of wastes or pollution at the source. This report will review source reduction activities reported by companies and will look at trends over time.

This report will provide Missouri citizens with more information about the environment in their communities so that they can take action where needed. It will provide an overview of what companies are doing, and have done, to minimize the pollution they generate and to protect Missouri citizens. The report will also point out where action may be lacking so citizens and industry can work together to solve possible problems.

It is hoped the public will find this report helpful and beneficial. If there are questions or comments, or a need for further information, please contact the Missouri Department of Natural Resources at 1-800-361-4827 or (573)-526-6627, or write to Missouri Department of Natural Resources, Technical Assistance Program, P.O. Box 176, Jefferson City, MO 65102.

THE TOXIC RELEASE INVENTORY

What is it?

The Toxic Release Inventory, known as the TRI, is a national database that contains information about releases of toxic chemicals to the environment. It was established by Congress in 1986 under the Emergency Planning Community Right-to-Know Act (EPCRA). This law requires manufacturing facilities to report the quantities of toxic chemicals they release to the air, land, or water on a routine or annual basis. It is this information that makes up the major portion of the TRI database. These releases are not illegal under the law. The only requirement under the TRI is that companies report their releases, which the EPA then makes available to the public.

As defined by Congress, a chemical is considered toxic under EPCRA if it is known to cause or can reasonably expect to cause

- adverse human health effects;
- cancer, mutagenic or other chronic disorder; or,
- serious harm to the environment;

at concentrations likely to exist beyond the facility boundary as a result of continuous or frequently occurring releases.

Who Must Report?

Manufacturing facilities that operate under Standard Industrial Classification codes 20 through 39, have 10 or more full time employees and manufacture, process or otherwise use listed toxic chemicals over certain thresholds must comply with the Toxic Release Inventory reporting requirements. Currently, the annual use threshold for “manufacture or process” is 25,000 pounds and the “otherwise use”

category is 10,000 pounds. Once a facility meets these criteria and exceeds one of these thresholds, they must report the quantity of each of the chemicals released to the environment.

How and When is The TRI Reported?

Each facility that must report under the TRI is required to submit a report for each TRI chemical they manufacture, process or otherwise use over the thresholds mentioned above. They may report using one of two formats: 1. A hard copy form known as the Form R, for each chemical; or, 2. Electronically, by submitting a diskette, which contains all of the chemicals they are reporting. Recently, EPA provided a shortened Form R known as a Form A. This form may be used if the total on and off-site releases or transfers for a given chemical is equal to or less than 500 pounds and the total annual usage is less than one million pounds. The Form A can also be submitted either in hard copy or electronic format.

A copy of the Form R is provided in Appendix A. A review of this form shows all the information a company is required to report concerning each TRI chemical they manage. This information is also contained in the electronic version of the TRI submission. The electronic software, supplied by EPA, facilitates the entry and submission of the data.

The TRI reports are submitted on or before July 1 of each year and cover the releases data for January 1 through December 31 of the preceding year. Although the data is received in July of a given year, it is not typically available until spring of the following year. For example, the 1997 data

was received on or before July 1, 1998 but was not released to the public until May 13, 1999. The reasons for this are twofold. It takes time to first enter the data into the computer. Then, EPA does extensive data analysis on the information for all 50 states. They then publish the results in hard copy and CD-ROM formats. When the public release occurs, the states are also supplied with electronic diskettes of the databases for their state. This is the data that Missouri uses to maintain the state database. Some states enter their own data as received from the facilities. Missouri does not enter their own data at this time.

Source Reduction

In 1990, Congress passed a law known as the Pollution Prevention Act (PPA). The purpose of this law was to prevent pollution through reduced generation or elimination of waste at the point of origin, also known as source reduction. Prior to this time, most environmental laws dealt with regulating hazardous wastes after they were generated. The PPA established a national policy that the best way to manage pollution was through source reduction. Source reduction, in part, was defined as any activity that reduced the generation of wastes prior to it entering a waste stream. Some states further defined source reduction as the reduced use of toxic chemicals. Use reduction is part of the PPA definition but these states mandated use reduction as part of their regulation. This is not the case in Missouri.

The PPA did establish a hierarchy of preferred waste management options with source reduction being first, reuse or recycle being second, treatment being third and disposal being last. Through the Toxics Release Inventory, the PPA now required facilities to report how they managed wastes both on and off-site. Several sections were added to the Form R to allow for these

reporting requirements. Companies were also required to report projected values for two future years plus report what methods they were using to reduce the generation of wastes. All of this information is summarized in Section 8 of the Form R. Companies first started reporting this information in 1991. More details about source reduction will be provided in the section entitled "Source Reduction in Missouri," later in this report.

How can the TRI be Used?

The Toxics Release Inventory data can be used in a variety of ways. One of Congress' main purposes in enacting EPCRA was to provide citizens with information about toxic chemicals in their community; this is the essence of the TRI. Through the use of the TRI, the public can identify sources of potential health risks in their communities. The TRI provides an avenue for the public to work with industry to reduce hazards associated with toxic chemicals.

Industry itself can use the data to identify problem areas, establish reduction targets, reduce costs associated with the purchase and disposal of toxic chemicals and monitor progress towards pollution prevention goals.

Federal, state and local governments can use the data to compare facilities or geographic areas, to evaluate existing environmental programs, or to target technical assistance efforts.

With the TRI data available on electronic database, it is easy to look at trends by county, by chemical, by facility or by any other criteria available in the database. Various trends will be looked at in the following sections of this report.

Limitations

Currently, over 600 chemical compounds or chemical categories are listed under Section 313 of the Emergency Planning Community Right-to-Know Act and are required to be reported under the Toxics Release Inventory. However, it should be noted that the Toxics Release Inventory does not rank the listed chemicals by degree of toxicity. Therefore, the releases data can not be used directly to evaluate the health risk for a given chemical. For example, relatively large releases of one chemical may not actually be as detrimental or hazardous as a smaller release of another chemical. Also, the TRI reports reflect only the total quantities of chemical releases on an annual basis, not exposure of the public to those chemicals. Release quantities alone are not sufficient to determine exposure or to calculate potential adverse effects on human health or the environment. However, the TRI does provide a basis to evaluate potential areas of concern.

Availability

The Toxics Release Inventory data is available both in hard copy and electronic format. EPA annually publishes a Public Data Release book along with a State Fact Sheets booklet. In 1996, EPA started publishing an Industry Sectors Analyses hard copy report. These hard copy reports

can be obtained through federal depository libraries located throughout the state. Also, copies may be obtained free of charge by calling the EPCRA Hotline at 1-800-424-9346.

Electronic versions of the database can be accessed through the Internet at the TRI home page (<http://www.epa.gov/opptintr/tri/>), or through contacting the Missouri Department of Natural Resources' Technical Assistance Program at (573) 526-6627 or 1-800-361-4827. The state maintains the state database for 1987 through 1997. This database can be provided free of charge on a single 3.5" diskette; however, database management software, such as FoxPro, Access, dBase or Paradox is needed to look at and analyze the data.

The EPA Web site typically only has the latest reporting year data available. However, there are other Web sites where previous year data can be accessed. Some of these are listed as follows:

Right to Know Network: <http://www.rtk.net>
Enviro Facts: <http://www.epa.gov/enviro>
Center for Environmental Information and Statistics: <http://www.epa.gov/ceis>
Environmental Defense Fund
- Scorecard: <http://www.scorecard.org>

CHANGES AND INITIATIVES

New Industries

In 1998, the Environmental Protection Agency added seven new industries that are to report under the Toxics Release Inventory. These industries are listed as follows:

- Metal Mining SIC 10xx
- Coal Mining SIC 12xx
- Electric Utilities SIC 4911
4931, 4939
- Commercial Hazardous Waste Treatment SIC 4953
- Chemicals and Allied Products – Wholesale SIC 5169
- Petroleum Bulk Stations SIC 5171
- Solvent Recovery Svcs. SIC 7389

These industries began reporting July 1, 1999 for their releases in 1998. Note that many of these industries such as the mining and electric utilities industries, have been regulated for air emissions for many years. This is the first time they will be reporting under the EPCRA law. Their data will be available to the public from EPA in 2000.

Some of these industries are making their TRI data available earlier because of expected adverse public response. This is especially true of the electric utilities industry. Even though toxic compounds in coal are only a very small percentage of the total, because of the very large quantities of coal they burn, large quantities of TRI chemicals will be reported being emitted on an annual basis. Early information about the TRI emissions from the electric utilities can be obtained from the Edison Electric Institute at the following Web site: (<http://www.eei.org>).

Addition of these seven industries is expected to have a significant impact to the reported TRI releases. These changes will be studied more fully in next year's annual report.

Chemical Changes

Over the years, several changes have occurred to the chemical reporting requirements under the Toxic Release Inventory. Table 1 summarizes some of these changes. Initially, there were only 308 chemicals listed. Several have been added, deleted or modified over the years, and in 1995 a group of 286 chemicals or chemical categories were added. As shown later in this report, several of these changes resulted in a significant impact on the reported releases in Missouri.

Also in 1996, an agreement was reached between EPA Region 7 and the charcoal industry in Missouri in which the charcoal industry would begin reporting their methanol emissions. This change greatly impacted the quantity of methanol being reported as releases to the air. The specific quantities and levels of the impact will be discussed later in this report. This agreement was unique to Region 7 and the charcoal industry in Missouri. In other regions, charcoal kilns have state regulations that require them to report and control their methanol emissions.

Because of the addition of the seven new industries in 1998, we expect that the 1998 TRI reports will show significant increases in air, land and water releases. These changes will need to be factored in when looking at the various environmental trends.

It is important to realize that these are not new releases, but are only newly reported under the TRI.

Phase III – Materials Accounting

A new TRI requirement being considered by EPA is “materials accounting” or “chemical use.” Only Massachusetts and New Jersey currently have this requirement in their statutes. Materials accounting means that companies will report and account for each TRI chemical, how much enters a facility, how much is transformed into products or wastes and how much leaves the facility site.

EPA’s view is that material accounting information could provide important insights on key safety, health and environmental issues. Some of these issues include emergency preparedness relating to amounts of chemicals flowing through communities, the overall quantities of toxics going into products, worker safety and health issues and each facility’s pollution prevention performance.

This proposed program is still being discussed between EPA and the stakeholders. There are concerns as well as benefits dealing with materials accounting that still must be worked out. More information about these issues can be obtained at the following Internet address: (<http://www.epa.gov/opptintr/tri/program.htm>).

New Initiatives

On Earth Day 1998, Vice President Gore announced the Chemical Right-to-Know initiative. This initiative has three major components. The first concerns obtaining more complete, basic toxicity information on high production volume (HPV) chemicals manufactured or used in the United States. EPA is initially proposing this as a voluntary program, whereby

industries would come forward on a voluntary basis to do the testing required to obtain this information.

The second is to establish lower reporting thresholds for what are known as persistent, bioaccumulative and toxic (PBT) chemicals. As the term implies, these are toxic chemicals that persist in the environment and bioaccumulate in animals and humans. Because of these characteristics, it is deemed necessary to decrease the reporting thresholds for these types of chemicals in order to better track and assess their effects. In 1999, EPA published a list of 53 chemicals that meet the above characteristics. They include the following 10 categories: dioxins and furans; chlorinated solvents; chlorobenzenes; other halogenated organics; pesticides; organonitrogens; nonhalogenated phenolics; phthalate esters; polycyclic aromatic hydrocarbons; and, metals. For a complete list of these chemicals contact DNR’s Technical Assistance Program at (573) 526-6627 or 1-800-361-4827. Further information can be obtained at (<http://www.pprc.org/pprc/pubs/topics/pbt.htm>)

The third part of this initiative is called the “Children’s Test Rule.” Because of children’s greater susceptibility, this rule would establish stricter and more complete toxicity testing of chemicals to which children are more likely to be exposed. EPA is currently conducting dialogue with the various stakeholders to determine the appropriate chemicals to test and the appropriate toxicology studies to conduct. EPA expects to have a finalized rule by the end of 1999. For more information on this topic, review the following web site: (<http://www.epa.gov/opptintr/chemrtk/childhlt.htm>).

TABLE I – Changes to the Toxic Release Inventory 1987 - 1998

Year	Industry Category	Chemicals	Other
1987-1989	Manufacturing	Initially 308 chemicals. Deleted: titanium oxide (87); CI acid blue #9; melamine crystal and sodium sulfate solution (88); and, sodium hydroxide solution (89). Modified: aluminum oxide, fibrous forms only (89).	Thresholds: manufacture and process: 75,000 lbs. (87), 50,000 (88) and 25,000 (89 and after). Otherwise use: 10,000 lbs. all years.
1990	Manufacturing	Added: allyl alcohol, cresote, 2,3-dichloropropene, dinitrobenzene, dinitrotoluene, isafrole, toluene diisocyanate. Deleted: terephthalic acid, CI pigment green 7 & 36, CI pigment blue 15.	Pollution prevention data elements added.
1991-1993	Manufacturing	Added 7 CFC's and halons (91). Deleted: barium sulfate, di-N-octyl phthalate (93).	
1994	Manufacturing; federal facilities added by executive order.	Added 11 HCFC's and 21 RCRA chemicals and 2 categories. Deleted acetone, copper monochloro-phthalocyanine pigment, butyl benzyl phthalate, ammonium sulfate solution. Modified: ammonia, sulfuric acid (fuming form only) and glycol ethers.	
1995	Manufacturing, federal facilities.	Added: 286 chemicals/chemical categories, mostly pesticides or pesticides ingredients. Deferred addition: 41 chemicals. Deleted: DEP, DEHA. Modifies: hydrochloric acid (fuming form only).	Alternate "Form A" reporting established.
1996-1997	Charcoal industry in Missouri required to report methanol emissions.	List contains 576 chemicals and 28 chemical categories.	
1998	Added: metal mining, coal mining, electric utilities, commercial hazardous waste treatment, chemical wholesale distributors, solvent recyclers and, wholesale bulk petroleum.	List contains 579 individual chemicals and 28 chemical categories. Included but on administrative stay: methyl mercaptan, hydrogen sulfide and 2,2-dibromo-3-propionamide.	
Proposed	Petition to add: transportation by air.	Proposed Rule: add certain dioxin-like chemicals. On going petitions to delist chemicals. Proposed rule: lower threshold for dioxin and PBT chemicals. Advanced notice of proposed rule: addition of materials accounting data.	

MISSOURI 1997 TRI RESULTS

TRI Releases by Environmental Media

In 1997, a total of 553 Missouri facilities reported releasing 33,788,155 pounds of toxic chemicals to the air; 20,171,157 pounds to the land; and, 3,332,020 pounds to the water. The total of all on-site releases was 57,291,332 pounds.

As shown in Figure 1, air releases were 59 percent of the total, land releases were 35 percent and water releases were 6 percent of the total.

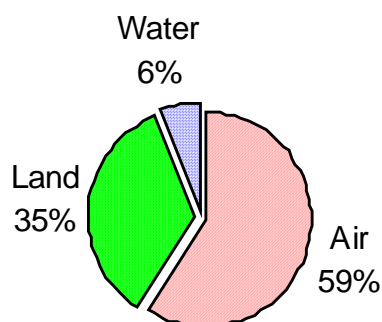


Figure 1. 1997 Releases by Media

These 553 companies also shipped 99,634,390 pounds off-site for energy recovery, recycling, treatment or disposal; and they sent 7,289,690 pounds to their local publicly owned treatment works (POTW) or sewer system.

TRI Releases by Industry Sector

The top three industrial sectors and their percentages of total on-site releases are:

1. Primary Metal Products (36.7%);
2. Chemical and Allied Products (26.5%); and,
3. Transportation Equipment (13.4%)

These three sectors accounted for 76.6 percent of all on-site releases reported in Missouri.

A list of all industry sectors represented in Missouri is provided in Table 2, with the total releases listed in descending order. The Primary Metals industry's releases were mainly land releases, the Chemical and Allied Products industry's were primarily to the air and water, and the Transportation Equipment industry's releases were almost entirely air releases as were many of the remaining industries.

The top ten industry sectors account for 98.6 percent of all releases in Missouri. These ten industries and their respective quantities of releases are shown in Figure 2. The companies and the chemicals associated with these releases will be discussed in the next sections.

TRI Releases by Chemical

In 1997, Missouri companies reported using a total of 201 different chemicals above the reporting thresholds. A complete listing of all the chemicals reported for 1997 is provided in Appendix B. However, twelve of these chemicals showed over 1,000,000 pounds each and accounted for 83.9 percent of the total. These twelve chemicals are listed in Table 3.

State of Missouri - 1997
Figure 2. Top 10 Industry Sectors

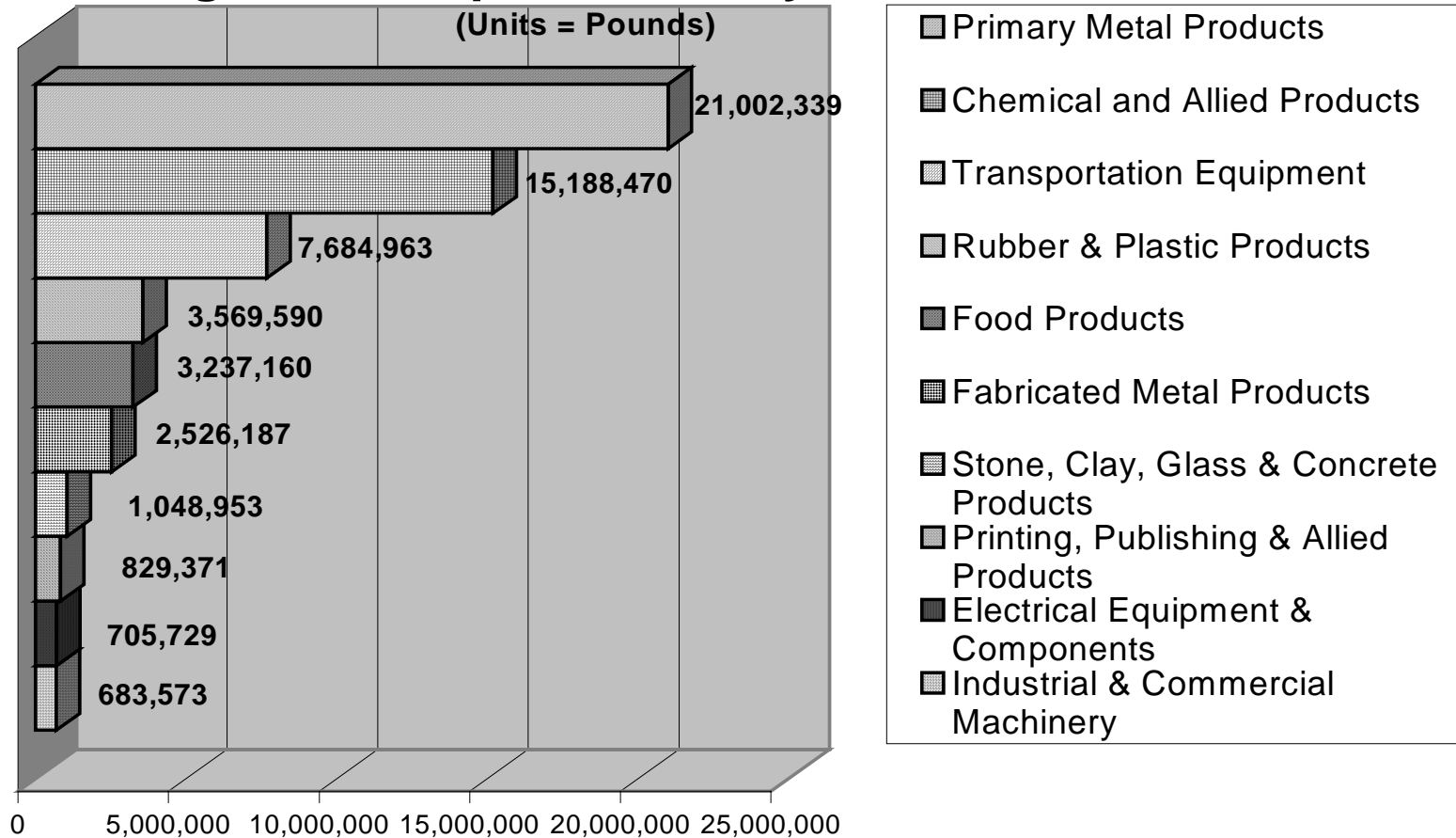


TABLE 2 – TRI Releases by Media and by Industry Sector – 1997 Data

SIC Code	Industry Sector Description	Releases to (Pounds)			Total Releases (Pounds)
		Air	Land	Water	
33	Primary Metal Products	1,662,330	19,337,210	2,799	21,002,339
28	Chemical and Allied Products	12,302,207	176,687	2,709,576	15,188,470
37	Transportation Equipment	7,650,248	34,385	330	7,684,963
30	Rubber & Plastic Products	3,524,961	44,602	27	3,569,590
20	Food Products	2,592,476	106,488	538,196	3,237,160
34	Fabricated Metal Products	2,437,466	9,746	78,975	2,526,187
32	Stone, Clay, Glass & Concrete Products	614,236	433,712	1,005	1,048,953
27	Printing, Publishing & Allied Products	829,371	0	0	829,371
36	Electrical Equipment & Components	686,359	18,855	515	705,729
35	Industrial & Commercial Machinery	681,408	2,163	2	683,573
25	Furniture & Fixtures	425,773	510	0	426,283
23	Apparel & other Finished Fabric Products	109,435	0	0	109,435
38	Measurement, Analytical, Photographic Equip.	78,755	0	4	78,759
39	Miscellaneous Manufacturing	61,654	0	0	61,654
26	Paper & Allied Products	53,984	0	0	53,984
24	Lumber & Wood Products	40,501	0	573	41,074
29	Petroleum Refining & Related Industries	15,464	6,799	5	22,268
31	Leather & Leather Products	12,930	0	13	12,943
22	Textile Products	7,617	0	0	7,617
xx	Federal Facilities & Non-Manufacturing	980	0	0	980
21	Tobacco Products	0	0	0	0
Sum Totals		33,788,155	20,171,157	3,332,020	57,291,332

Zinc and lead are shown in Table 3 with a plus (+) sign. This was done because in the data, these chemicals are reported as zinc (fume or dust), zinc compounds, lead and lead compounds, respectively. However, review of the data showed that the chemicals were the same but were being reported slightly differently by the two smelting and refining companies of Doe Run and Asarco. Therefore, in Table 3 these two groups of chemicals are combined. Based on this, zinc was the single largest chemical reported. The other 11 chemicals are shown in descending order of total releases in Table 3. The primary media to which the chemical was reported released is also shown.

TABLE 3 – Releases of top 12 Chemicals

Chemical Name	Primary Media	Total Releases (Pounds)
Zinc +	Land	14,427,247
Methanol	Air	10,020,787
Lead +	Land	4,967,549
Xylene	Air	4,362,721
Nitrate Compounds	Water	2,682,213
Toluene	Air	1,995,570
n-Hexane	Air	1,907,774
Glycol Ethers	Air	1,835,102
Methyl Ethyl Ketone (MEK)	Air	1,835,433
Ammonia	Air/Water	1,671,514
Styrene	Air	1,236,924
Methyl Isobutyl Ketone (MIBK)	Air	1,142,062
Total		48,083,896

Top Twelve TRI Chemicals: Uses and Hazards

A listing of many of the common chemicals, their uses and hazards is provided in Appendix D. The quantity of releases cannot be used as a direct measure of exposure. Many other factors need to be considered. The toxicity information is intended for general reference only. The year 1988 will be used as a baseline.

Zinc and Lead

Zinc and zinc compounds are often used as coatings on iron and steel to provide corrosion protection. Zinc is used in making brass alloys, car parts, dry cell batteries and paints and fumigants. Zinc dust is flammable and is a human skin irritant.

Lead is most commonly known for its use in lead-acid batteries and ammunition. Lead compounds, in the past, were used as a gasoline additive and lead is used for radiation shielding. It is a poison if ingested and can cause brain damage, particularly in children. It is a suspected carcinogen of the lungs and kidneys.

In Missouri, the releases of these two chemicals are primarily reported as land releases by the two large smelting and refining companies of Doe Run in Herculaneum, MO and Asarco in Annapolis, MO. Releases are the slag from their smelting operations and are deposited in landfills, land treatment areas or impoundments on their properties.

TABLE 4 – Largest Releases of Lead and Zinc in 1997

Company	Chemical	On-Site Releases (Pounds)			Total Releases (Pounds)
		Air	Land	Water	
Doe Run	Zinc +	39,817	7,151,978	162	7,191,952
Doe Run	Lead +	202,620	1,067,870	143	1,270,633
Asarco	Zinc +	12,272	6,795,500	7	6,807,779
Asarco	Lead +	46,180	3,443,195	5	3,489,380

The air releases reported by Doe Run and Asarco for the zinc and lead compounds amounted to 300,884 pounds. Water releases totaled 317 pounds. These releases are summarized in Table 4.

The total releases for zinc and zinc compounds to all three media, for both companies, is 14,133,836 pounds. This is 98.0 percent of the total zinc shown in Table 3. The value for lead and lead compounds is 4,859,089 pounds, which accounts for 97.8 percent of the total lead reported. Note that these companies are both part of the Primary Metal Products industry.

Zinc and lead releases have both decreased significantly since 1988. Zinc and zinc compounds have shown a 47.5 percent decrease from the 1988 levels of 30,354,126 pounds. Lead and lead compounds have shown a 41.5 percent decrease, down from the 8,484,395 pounds reported in 1988. These decreases are primarily attributable to the release reductions reported by Doe Run. (See the sections on Trends Analysis later in this report.)

Methanol

Methanol is an alcohol and is commonly used as a solvent, a cleaner or as a fuel. It can cause blindness if ingested and has a mild toxicity if inhaled.

The greatest portion of the methanol releases reported in Missouri are from the charcoal manufacturing industry. In 1996, charcoal manufacturers in Missouri that still use the Missouri batch type kilns were required by EPA to start reporting their emissions of methanol in the TRI. Missouri batch kilns are simple, enclosed structures in which wood is manually loaded and allowed to burn or pyrolyze under low oxygen conditions.

The charcoal industry strongly disagreed with this decision but industry publications, as well as a study funded by EPA, both report that methanol is generated and emitted during this type of charcoal manufacturing process. The charcoal industry expanded during one period of time based on the production of methanol as a saleable byproduct.

Estimates of emission factors for methanol range between 76 to 144 pounds per ton of charcoal manufactured. The charcoal industry was required to report using the higher emission factor of 144 pounds per ton.

The charcoal industry has also been required to begin installing pollution control devices, such as after burners, on these types of kilns. These controls are to be phased in over a seven-year period; therefore, we should see significant decreases in methanol releases over the next few years. The total methanol

releases reported in 1995 was 2,533,133 pounds. In 1996, it was 9,403,452 pounds. Ninety six percent of the increase was due to the addition of the charcoal industry in the TRI.

Table 5 shows the six companies that reported the largest releases of methanol for 1997. These quantities account for 92.6 percent of the total shown on Table 3. All of these companies are in the Chemical and Allied Products category (SIC 28xx) and four of the six are charcoal manufacturers. All of the methanol releases reported were releases to the air.

The total methanol releases reported for 1997 was 10,020,787 pounds. The four charcoal manufacturers listed in Table 5 account for 73.8 percent of the total.

Between 1988 and 1997, there was an increase in reported methanol emissions of 213 percent. However, if the releases from the charcoal industry were not included, there would have been a 17.7 percent decrease.

Xylene

The reported releases of xylene in Missouri totaled 4,362,721 pounds during 1997. It was the fourth ranked chemical. Xylene is a widely used solvent. It is used in making drugs, dyes, insecticides; as a solvent for paints; and, is one of the hydrocarbons in

gasoline. It is flammable and has a mild toxicity by ingestion or inhalation.

In Missouri, xylene is used by many different industries. Twelve of the 20 different industry sectors reporting under the TRI reported some releases of this chemical in 1997. The majority is used in the Transportation Equipment (37xx) and the Rubber and Plastic Products industries (30xx), with significant amounts in the Furniture and Fixtures (25xx) and Electrical Equipment and Components (36xx) industries. Table 6 lists those companies that reported greater than 100,000 pounds of releases of xylene in 1997. Xylene is a highly volatile chemical, meaning it readily vaporizes to a gas; therefore, all of the reported releases are air releases.

The eight companies shown in Table 6 account for 73.5 percent of the total xylene releases in Missouri for 1997.

Since 1988, there has been a 60.5 percent decrease in the reported releases of xylene. In 1988, the reported releases were 11,046,480 pounds. Six companies can be credited with the major portion of this decrease. These companies are shown in Table 7. Note that there are actually two Chrysler automobile plants in Fenton, MO. The six facilities shown in Table 7, accounted for 4,604,060 pounds of reduction in xylene releases, or 68.9 percent of the total decrease from 1988 to 1997.

TABLE 5 – Companies Reporting Largest Releases of Methanol in 1997

Company	City	SIC	Total Releases	% of Total
Royal Oak Ent.*	Ellsinore	2861	3,255,696	32.5%
Craig Industries*	Summersville	2861	2,722,752	27.2%
Missouri Chemical Works	Louisiana	2869	1,643,000	16.4%
Patio Chef Co.*	Licking	2861	809,712	8.1%
Royal Oak Ent.*	Salem	2861	601,200	6.0%
Teva Pharmaceuticals	Mexico	2834	242,060	2.4%
		Total	9,274,420	92.6%

* Charcoal industries.

(Units are in pounds.)

TABLE 6 – Companies Reporting Largest Releases of Xylene in 1997

Company	City	SIC	Total Releases	% of Total
Ford Motor Co.	Claycomo	3711	1,264,000	29.0%
Ford Motor Co.	Hazelwood	3711	566,500	13.0%
3M	Nevada	3081	421,900	9.7%
Huffy Bicycle Co.	Farmington	3751	260,000	6.0%
SAI Automotive USA	Kansas City	3714	201,935	4.6%
GM Truck Group	Wentzville	3713	186,000	4.3%
Leggett and Platt	Springfield	2511	167,781	3.8%
Fasco Industries, Inc.	Eldon	3621	138,952	3.2%
		Total	3,207,068	

(Units are in pounds)

TABLE 7 – Companies Reporting Largest Reduction of Xylene Since 1988 to 1997

Company	City	1988	1997	Pounds Reduced
3M	Nevada	1,576,736	421,900	1,154,836
Chrysler Corp.	Fenton	1,518,000	93,600	1,424,400
Chrysler Motors Corp.	Fenton	553,000	40,000	512,900
GMC	Wentzville	625,000	186,000	439,000
Canam Steel	Washington	568,469	- 0 -	568,469
Marchem	New Haven	512,072	7,617	504,455
		Total Reduction		4,604,060

(Units are in pounds)

Nitrate Compounds

The reported releases of nitrate compounds for 1997 totaled 2,682,213 pounds. It was the fifth ranked chemical in total releases. (See Table 3.)

Nitrate compounds are used in the manufacture of explosives and fertilizers and a variety of other chemical processes. If involved in a fire, they may cause explosions and may react violently with fuels. Direct contact with nitrate compounds may cause burns to the skin and eyes. Combustion of nitrate compounds may cause irritating or poisonous gases.

Under the TRI, nitrate compounds are treated as a category and were first reportable in 1995. They are only reportable when in aqueous solution and therefore the on-site releases are reported primarily as water releases.

In Missouri, the greatest percentage of nitrate compounds releases are reported by

the explosives and fertilizer manufacturers. Table 8 shows the companies that reported the largest releases of nitrate compounds in 1997.

The five companies shown in Table 8 account for 91.7 percent of all the nitrate compound releases in 1997. Two of the companies are explosives manufacturers (SIC 2892) and two are fertilizer manufacturers (SIC 2873). Premium Standards Foods is a meat packing company (SIC 2011).

Nitrate compounds were not required to be reported until the 1995 reporting year. There has been very little change from the 1995 levels of 2,656,175 pounds. The reporting of these releases starting in 1995 did have a significant impact on the reported water releases between 1994 and 1995. This will be discussed in more detail later in this report.

TABLE 8 – Companies Reporting Largest Releases of Nitrate Compounds in 1997

Company	City	SIC	Total Releases	% of Total
Dyno Nobel, Inc.	Carthage	2892	812,412	28.4%
Dyno Nobel, Inc.	Louisiana	2873	670,000	23.4%
Premium Standard Foods	Milan	2011	520,000	18.2%
ICI Explosives	Joplin	2892	501,000	17.5%
La Roche Industries, Inc.	Festus	2873	122,285	4.3%
Total Releases			2,625,697	

(Units are in pounds.)

Toluene, MEK and MIBK

Toluene, methyl ethyl ketone (MEK) and methyl isobutyl ketone (MIBK) were ranked sixth, ninth and 12th, respectively, in Table 3. They are being grouped together here because they are so widely used in many different industries. These three chemicals are commonly used as solvents for paints, adhesives and plastics as well as a variety of other applications. They are all highly flammable and are toxic or moderately toxic by inhalation or ingestion. (For more details on hazards of each chemical, see Appendix D.)

As stated, these are widely used chemicals. As shown in Figure 3, 77 companies in 14 different industry sectors reported some

releases of toluene. Similar numbers are seen for MEK and MIBK. Note that although the number of industry sectors appears relatively small compared to the number of companies in Figure 3, their percentages of the possible industry sectors, which is 20, is relatively large. For example, 14 industry sectors represent 70 percent of the possible sectors reporting, 12 equals 60 percent and 8 equals 40 percent.

However, as seen with many of the other chemicals, a few companies or industry sectors account for the majority of the releases. Table 9 provides a listing of the companies that reported over 100,000 pounds of annual releases of one or more of these chemicals.

Figure 3. Number of Companies & Industry Sectors Reporting Releases of Toluene, MEK & MIBK

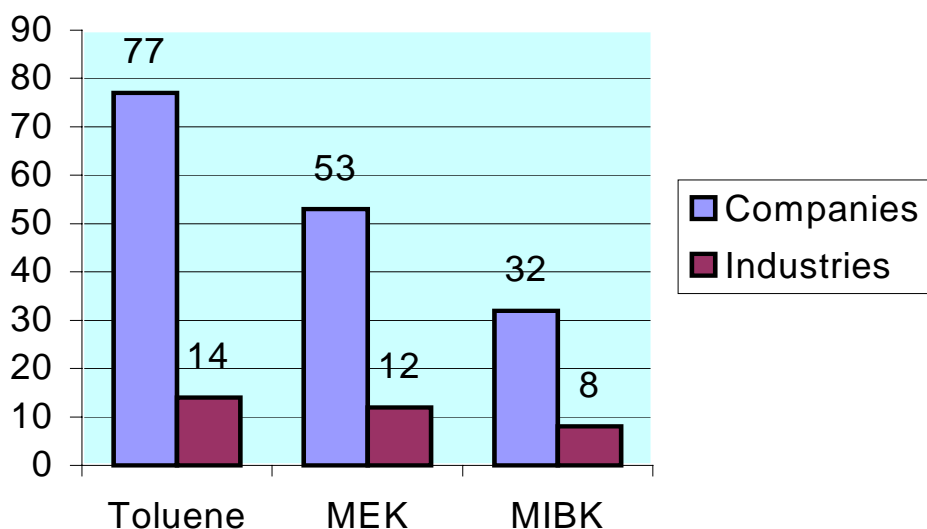


TABLE 9 – Companies Reporting Largest Releases of Toluene, MEK and MIBK for 1997

Company or Sector	City	Industry Code	Chemical	Total Releases	% of Total*
3M Company	Springfield	2891	Toluene	247,370	12.4%
Plastene Supply Co.	Portageville	3471	Toluene	230,845	11.6%
Teva Pharmaceuticals	Mexico	2834	Toluene	204,320	10.2%
Silgan Containers	St. Joseph	3411	MEK	279,523	15.2%
S-R Finishing	Portageville	3089	MEK	237,130	12.9%
3M Company	Nevada	3081	MEK	234,400	12.8%
TG USA Corporation	Perryville	3714	MEK	176,420	9.6%
3M Company	Springfield	2891	MEK	127,373	6.9%
Ford Motor Company	Claycomo	3711	MIBK	503,000	44.0%
Ford Motor Company	Hazelwood	3711	MIBK	171,200	15.0%

- Percentage of the specific chemical. (Units are in pounds.)
Note, the company percentage is also included in the sector percentage in Table 9a.

TABLE 9a – Industries Reporting Largest Releases of Toluene, MEK and MIBK for 1997

Industry or Sector*	Industry Code	Chemical	Total Releases	% of Total
Chemical and Allied Products (23)	28xx	Toluene	608,777	30.5%
Fabricated Metal Products (10)	34xx	Toluene	392,226	19.7%
Transportation Equipment (16)	37xx	Toluene	374,890	18.8%
Rubber and Plastics Products (5)	30xx	MEK	538,701	29.4%
Fabricated Metal Products (11)	34xx	MEK	432,893	23.6%
Transportation Equipment (8)	37xx	MEK	357,500	19.5%
Transportation Equipment (7)	37xx	MIBK	815,310	71.4%

- Number in () indicates number of companies reporting for this chemical in that industry sector. (Units are in pounds.)

TABLE 10 – Changes in Toluene, MEK and MIBK Releases Since 1988

Chemical	Total 1988 Releases	Total 1997 Releases	Amount of Change	% of Change
Toluene	6,268,144	1,995,570	4,272,574	-68.2%
MEK	3,288,156	1,834,433	1,453,723	-44.2%
MIBK	1,029,870	1,142,062	112,192	+10.9%

(Units are in pounds.)

The industry sectors reporting the largest percentages of toluene, MEK or MIBK releases are shown in Table 9a. All of these releases are reported as air releases. The Transportation Equipment industry (SIC 37xx) shows the largest proportion for the releases of MIBK and also accounts for significant amounts of toluene and MEK.

The Chemical and Allied Products industry shows the largest percentage of toluene releases and the Rubber and Plastic Products industry shows the single largest percentage of the MEK releases.

There have been substantial decreases for toluene and MEK since 1988. A brief summary of the changes are shown in Table 10.

Review of the data shows there have been significant shifts in the reported releases over the years for MIBK. From 1996 to 1997, there was actually a 37.0 percent, or 669,365 pounds, decrease. But between 1988 and 1997, there has been a 10.9 percent increase. The other two chemicals

have shown fairly steady decreases over this time period.

n-Hexane

n-Hexane was the seventh most reported chemical in 1997. n-Hexane was included in the 286 chemicals added to the TRI in 1995.

n-Hexane is a constituent of petroleum ether and of gasoline and is used as a rubber solvent. It can also be used as a solvent for adhesives and for vegetable oils. Health effects from inhalation or ingestion may include distorted vision, hallucination, headache, dizziness, nausea and irritation of the eyes and throat.

In Missouri, the reported releases of n-Hexane are all reported as air releases and are almost exclusively reported by the soybean and cottonseed oil industry. n-Hexane is used to extract the oil from the soybean or cottonseed flake. The following five companies, shown in Table 11, reported 94.1 percent of all the n-Hexane released in Missouri.

TABLE 11 – Companies Reporting Largest Releases of n-Hexane in 1997

Company	City	SIC	Total Releases	% of Total
AG Processing, Inc.*	St. Joseph	2075	589,000	30.9%
Osceolo Products Co.**	Kennett	2074	535,000	28.0%
ADM	N. Kansas City	2075	277,763	14.6%
Cargill, Inc.	Kansas City	2075	248,666	13.0%
ADM	Mexico	2075	145,314	7.6%

* Soybean processing.

** Cottonseed processing.

(Units are in pounds.)

TABLE 12 – Largest Reductions in n-Hexane Releases, 1995 to 1997

Company	City	Releases		Change	% Reduction
		1995	1997		
AG Processing	St. Joseph	1,072,470	589,000	483,470	45.0%
ADM	N. Kansas City	595,268	277,763	317,505	53.3%
Cargill, Inc.	Kansas City	456,000	248,666	207,334	45.5%
Total Pounds				1,008,309	

Since 1995 there has been a decrease of 35.5 percent in total reported releases of n-Hexane. That is a decrease of 1,048,927 pounds. The three companies listed in Table 12 reported the majority of this reduction.

Glycol Ethers

Glycol ethers are the eighth most reported chemical, based on total releases, as shown in Table 3. Their total releases equaled 1,835,102 pounds for 1997.

Glycol ethers are commonly used as solvents. They are toxic by inhalation, ingestion or skin absorption. They are irritating to the eyes, nose, throat and skin. Because they readily volatilize, they are most commonly reported as air releases, but also sometimes as land releases.

In Missouri, glycol ethers are most widely

used by the Transportation Equipment (37xx) and the Fabricated Metal Products (34xx) industries. Table 13 lists those companies that reported greater than 100,000 pounds of glycol ether releases for 1997.

As shown in Table 13, the eight companies listed account for just over 80 percent of the total glycol ether releases reported in Missouri. Most are in the Transportation Equipment (SIC 37xx) and Fabricated Metals Products (SIC 34xx) industries. One company is in the Printing and Publishing (SIC 27xx) industry.

Glycol ethers have shown a significant reduction in reported releases since 1988. Their total reported releases in 1988 were 2,852,207 pounds. Compared to the 1997 total of 1,835,102, this is a 35.7 percent decrease.

TABLE 13 – Companies Reporting Largest Releases of Glycol Ethers in 1997

Company	City	Industry Code	Total Releases	% of Total
GM Truck Group	Wentzville	3713	304,000	16.6%
Borden Packaging	St. Louis	2754	231,000	12.6%
Silgan Container	St. Joseph	3411	216,706	11.8%
Ford Motor Co.	Hazelwood	3711	192,400	10.4%
Chrysler Corporation #1	Fenton	3711	155,000	8.4%
Metal Container Corp.	Arnold	3411	140,500	7.6%
Chrysler Corporation #2	Fenton	3711	136,000	7.4%
Ford Motor Company	Claycomo	3711	106,000	5.7%
Totals			1,481,606	80.5%

(Units are in pounds.)

TABLE 14 – Companies Reporting Largest Reductions of Glycol Ethers, 1988 to 1997

Company	City	Releases		Change	% Reduction
		1988	1997		
Borden Packaging	St. Louis	689,000	231,000	458,000	66.5%
American National Can Co.	Pevely	349,590	-0-*	349,550	100.0%
Ford Motor Co.	Claycomo	312,000	106,000	206,000	66.0%
Ford Motor co.	Hazelwood	331,900	192,400	139,500	42.0%
Reynolds Metals Co.	Kansas City	144,748	90,875	53,873	37.2%

* This company stopped reporting glycol ether releases in 1995.

(Units are in pounds.)

The companies that showed the largest reductions of glycol ether releases are listed in Table 14.

These five companies contributed a total of 1,206,963 pounds of reported reductions. Because other companies showed significant increases, this value is actually greater than the 35.7 percent decrease referenced above.

Ammonia

Ammonia was the 10th highest reported chemical at 1,671,514 pounds. Ammonia is reported both as air and water releases with some land releases. Ammonia is a commonly used household cleaner and is often used in the manufacture of fertilizers and explosives. It is also used in the manufacture of plastics, dyes, textiles and pharmaceuticals. It can irritate the nose, eyes, mouth, throat and lungs. Exposure to concentrated fumes can be fatal.

In Missouri, ammonia is reported chiefly by the Chemical and Allied Products (SIC 28xx) and the Food Products (SIC 20xx) industries. These two industrial sectors reported over 95 percent of the total ammonia releases. The following table lists the companies that reported the greatest percentages of releases. A total of 45 companies reported some releases of ammonia.

As shown in Table 15, these five companies account for 80.5 percent of the total ammonia releases in Missouri for 1997. The Biokyowa Company in Cape Girardeau is a pharmaceuticals manufacturer, ICI is an explosives manufacturer and Dyno Nobel in Louisiana makes nitrogen fertilizers. George's Processing processes poultry and Combustion Engineering manufactures industrial chemicals.

TABLE 15 – Companies Reporting Greatest Percentage of Ammonia Releases in 1997

Company	City	SIC	Total Releases	Primary Media	% of Total
Biokyowa, Inc.	Cape Girardeau	2834	711,846	Water	42.6%
ICI Explosives, Inc.	Joplin	2892	291,905	Air	17.5%
Dyno Nobel, Inc.	Louisiana	2873	196,700	Air	11.8%
George's Processing	Butterfield	2015	86,526	Air	5.2%
Combustion Engineering, Inc.	Hematite	2819	57,250	Air	3.4%
Total			1,344,227		80.5%

(Units are in pounds.)

TABLE 16 – Largest Changes in Reported Ammonia – 1988 to 1997

Company	City	Releases		Change	% Change
		1988	1997		
Biokyowa, Inc.	Cape Girardeau	12,480	711,846	+699,366	+5604.0%
Dyno Nobel, Inc.	Louisiana	807,319	196,700	-610,619	-75.6%
American Cyanamid	Palmyra	75,050	675	-74,375	99.1%
Combustion Engineering*	Hematite	50	57,250	+57,200	+1144.0%
ICI Explosives, Inc.	Joplin	620,357	291,905	-328,452	-52.9%

* These increases are due to their recycle/recovery processes for uranium recovery.

(Units are in pounds.)

The reported releases of ammonia has declined since 1988, but only by approximately a half million pounds. The 1988 releases were reported at 2,120,061 pounds and the 1997 level was 1,671,514. This is a decrease of 448,547 pounds, or 21.2 percent.

Table 16 shows some of the largest changes reported over this time period. The increases are most likely due to increased production. Reductions may occur due to a variety of factors including reduced production, more efficient processing, elimination of the use of a toxic chemical, better management practices or other factors. As we will see later in this report, changes in ammonia reporting requirements also reduced the amount of releases reported. (See the sections on Chemical Trends and Source Reduction.)

Styrene

Styrene was the 11th greatest reported chemical, at 1,236,924 pounds. (See Table 3). This is the last chemical to be discussed in this report.

Styrene is the monomer used to make polystyrene. It is also used in other resins, as well as to make protective coatings, various plastics and synthetic rubbers. It is

also used as an insulator material. It is toxic if inhaled or ingested and can react vigorously with oxidizing agents. It will emit an acrid smoke and irritating fumes when heated to decomposition.

Releases of Styrene in Missouri are most prominently reported by the Rubber and Plastics Products (30xx) industry along with various Transportation Equipment (37xx) companies. Styrene is most commonly reported as an air release but there were some land releases.

Table 17 lists the companies that reported the largest releases of styrene for 1997. As shown in Table 17, these six companies account for 82 percent of the total styrene releases in Missouri. The first two companies, Trinity Marine and G. W. Composites, are plastic products manufacturers. Tracker Marine is a boat manufacturer and Able Body Corporation and Able Fiberglass manufacture truck bodies. Sportsman Inc. manufactures travel trailers or campers.

Styrene is the only chemical of the top twelve that has shown a substantial increase in total releases since 1988.

TABLE 17 – Companies Showing Largest Reported Releases of Styrene in 1997

Company	City	SIC	Total Releases	Media	% of Releases
Trinity Marine	Caruthersville	3089	290,032	Air	23.4%
G.W. Composites	O'Fallon	3089	269,755	Air	21.8%
Tracker Marine	Clinton	3737	205,077	Air	16.6%
Able Body Corporation	Joplin	3713	133,000	Air/Land	10.7%
Able Fiberglass, Inc.	Joplin	3713	58,746	Air/Land	4.7%
Sportsman, Inc.	Rogersville	3792	57,235	Air	4.6%
Totals			1,013,845		82.0%

(Units are in pounds.)

At that time, the total releases were reported at 279,127 pounds. In 1997 there was 1,236,924 pounds reported, an increase of 957,797 pounds. This adds up to a 343 percent increase between 1988 and 1997.

Review of the TRI data shows that a total of only 17 companies reported styrene releases in 1988; 33 companies reported styrene releases in 1997. Also, of the six companies shown in Table 17 only G. W. Composites submitted a TRI report in 1988. Furthermore, their reported releases in 1988 were 60,643 pounds. If this number is subtracted from the total releases shown in Table 17 the resulting increase is 953,202 pounds. This is 99.5 percent of the increase noted above. Therefore, it can be concluded that a major reason for the styrene increase is the greater number of companies now reporting the use of styrene. G.W. Composites was responsible for 21.8 percent of the total increase.

TRI Releases by County

There are many ways to view or examine the TRI data. One additional way is to look at the releases by county. Many of the companies that report under the TRI are concentrated in the larger cities; however, many are also scattered throughout the state. Figure 4 shows a graphical representation of the number of pounds of total releases reported per county across the state. As can be seen in this figure, there are approximately 20 counties with relatively high annual releases, in the range of 500 thousand to 10 million pounds. A similar number have a mid range between 100 to 500 thousand pounds, and many have very few or zero releases. A complete list of

the total releases per county is provided as Appendix F. Note that Figure 4 does tend to follow the pattern of the larger metropolitan areas, such as St. Louis, Kansas City, Springfield, in Greene County, and Joplin, in Jasper County. Some of the south central counties where some of the larger releases are also indicated, such as Dent, Shannon and Carter, are where the large charcoal manufacturers are located.

Figure 5 shows the top 12 counties and their respective total releases. If the total releases in these 12 counties are added together, they equal 46,110,670 pounds, or 80.5 percent of the state total in 1997. Iron and Jefferson counties far exceed any of the others. These are the two counties where the two large smelting facilities of Asarco and Doe Run are located, respectively.

TRI Releases by Company

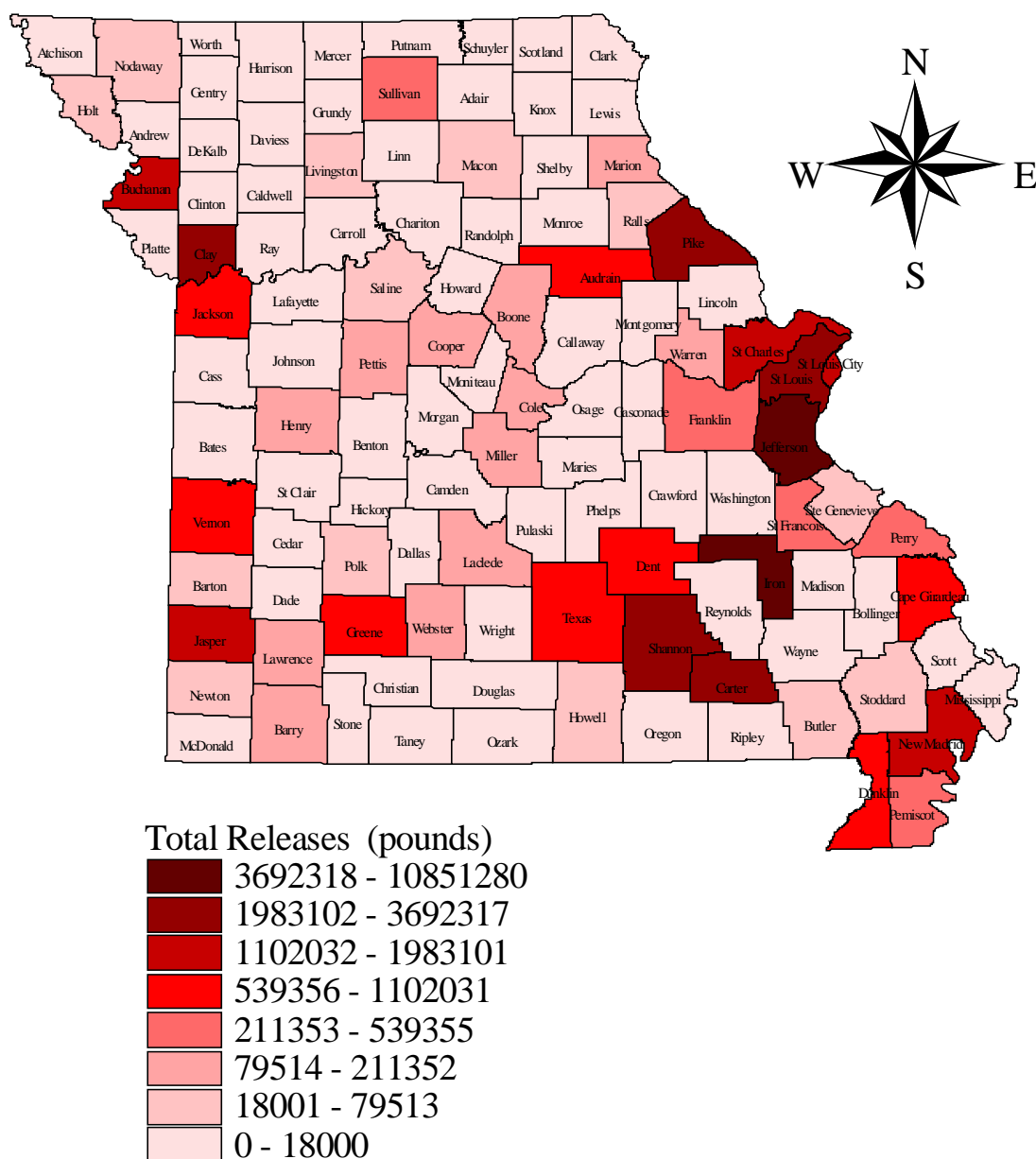
Table 18 provides a list of the top 30 companies that reported the greatest total releases for 1997. Many of these companies were referenced in the previous sections of this report where the top 12 chemicals were discussed. These 30 companies account for 80.3 percent of the total releases for 1997. Using Table 18 and with reference to the county map shown in Figure 4, one can identify which companies account for the larger releases in their respective county.

Due to the large number of chemicals reported by many of these companies it was not practical to supply all of the TRI data in this report. If specific chemical information is desired for an individual company, please contact DNR's, Technical Assistance Program at 1-800-361-4827 or (573)-526-6627.

TABLE 18 – Top 30 Companies Reporting Greatest Annual Releases – 1997

Facility	Industry Code	City	County	On-site Releases (Pounds)			
				Air	Land	Water	Total
Asarco, Inc.	3339	Annapolis	Iron	63,262	10,787,952	24	10,851,238
Doe Run	3339	Herculaneum	Jefferson	262,535	8,466,990	405	8,729,930
Royal Oak Enterprises, Inc.	2861	Ellsinore	Carter	3,255,696	-0-	0-0	3,255,696
Craig Industries	2861	Summersville	Shannon	2,722,752	-0-	-0-	2,722,752
Ford Motor Company	3711	Claycomo	Clay	2,456,496	-0-	-0-	2,456,496
Missouri Chemical Works	2869	Louisiana	Pike	1,846,900	-0-	-0-	1,846,900
Dow Chemical Company	3086	Pevely	Jefferson	1,358,896	-0-	-0-	1,358,896
Ford Motor Company	3711	Hazelwood	St. Louis	1,235,451	-0-	-0-	1,235,451
3M	3081	Nevada	Vernon	922,100	-0-	15	922,115
Dyno Nobel, Inc. Lomo Plant	2873	Louisiana	Pike	194,700	-0-	680,000	874,700
GM Truck Group	3713	Wentzville	St. Charles	866,499	-0-	-0-	866,499
Dyno Nobel	2892	Carthage	Jasper	7,075	-0-	828,802	835,877
Patio Chef Company LLC	2861	Licking	Texas	809,712	-0-	-0-	809,712
ICI Explosives USA, Inc.	2892	Joplin	Jasper	292,055	755	507,150	799,960
Silgan Containers Mfg. Corp.	3411	St. Joseph	Buchanan	715,713	-0-	-0-	715,713
Biokyowa, Inc.	2834	Cape Girardeau	Cape Girardeau	7,924	171,915	535,843	715,682
Holnam, Inc.	3241	Clarksville	Pike	338,835	359,743	-0-	698,578
Noranda Aluminum, Inc.	3334	New Madrid	New Madrid	620,204	2,794	-0-	622,998
Royal Oak Enterprises, Inc.	2861	Salem	Dent	601,200	-0-	-0-	601,200
AG Processing, Inc.	2075	St. Joseph	Buchanan	589,000	-0-	-0-	589,000
Plastene Supply Company	3471	Portageville	New Madrid	489,262	-0-	77,489	566,751
Premium Standard Foods	2011	Milan	Sullivan	2,055	-0-	537,300	539,355
Osceola Products Company	2074	Kennett	Dunklin	535,000	-0-	-0-	535,000
Chrysler Corporation	3711	Fenton	St. Louis	475,198	-0-	-0-	475,198
Borden Packaging and Indl.	2754	St. Louis	St. Louis	469,296	-0-	-0-	469,296
Teva Pharmaceuticals USA	2834	Mexico	Audrain	446,880	-0-	-0-	446,880
3M	2891	Springfield	Greene	404,988	-0-	-0-	404,988
Chrysler Corporation	3711	Fenton	St. Louis	355,052	-0-	-0-	355,052
SAI Automotive USA Kansas	3714	Kansas City	Clay	347,968	-0-	-0-	347,968
Anheuser-Busch, Inc.	2082	St. Louis	St. Louis City	344,833	-0-	-0-	344,833
Total Facilities: 30				Total Releases: 45,994,714			

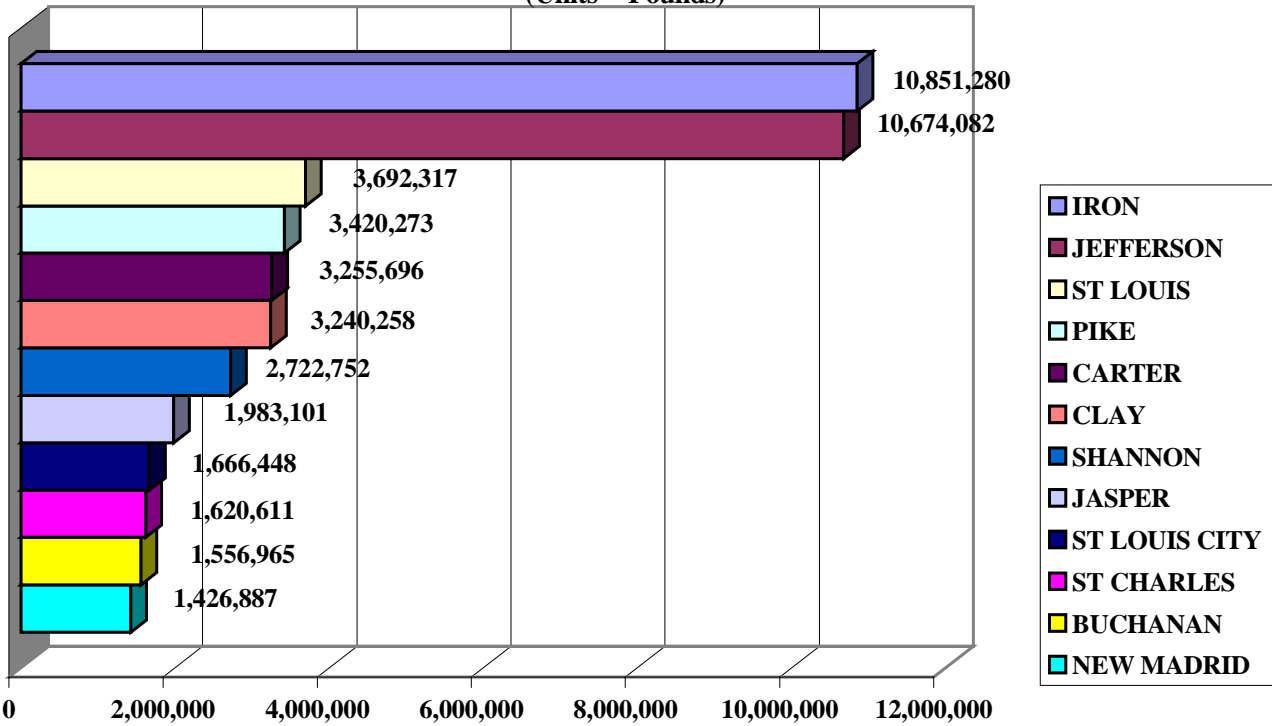
Figure 4. 1997 TRI Releases by County



State of Missouri

Figure 5. Twelve Counties Showing Highest Releases for 1997

(Units = Pounds)



TRENDS ANALYSIS – 1988 TO 1997

It is important to examine the TRI data and the changes that have occurred from year to year. Some of these trends were previously discussed for the top 12 chemicals and for some of the companies that reported these changes. The next sections discuss various overall trends and the reasons for some of the more significant differences from year to year. A discussion of some of the trends by chemical and then by company is also made.

Statewide Trends 1988 - 1997

The TRI was started in 1987, which was the first reporting year. However, due to the learning curve for the start up year, the data for 1987 is often disregarded because of various errors found. Therefore, EPA commonly uses 1988 as the base year for

comparisons. Also, because of threshold reporting changes, additions and deletions of various reportable chemicals and the inclusion of additional industries, direct comparisons between years are not completely accurate. However, general trends can still be seen.

Figures 6 and 7 graphically represent the trends in total releases between 1988 and 1997. Figure 6 stacks the three media together so that the trend for total releases can be easily seen. Figure 7 separates the three media (air, land and water) so trends by media can be more easily seen. The data used to generate these figures are recorded in Table 19.

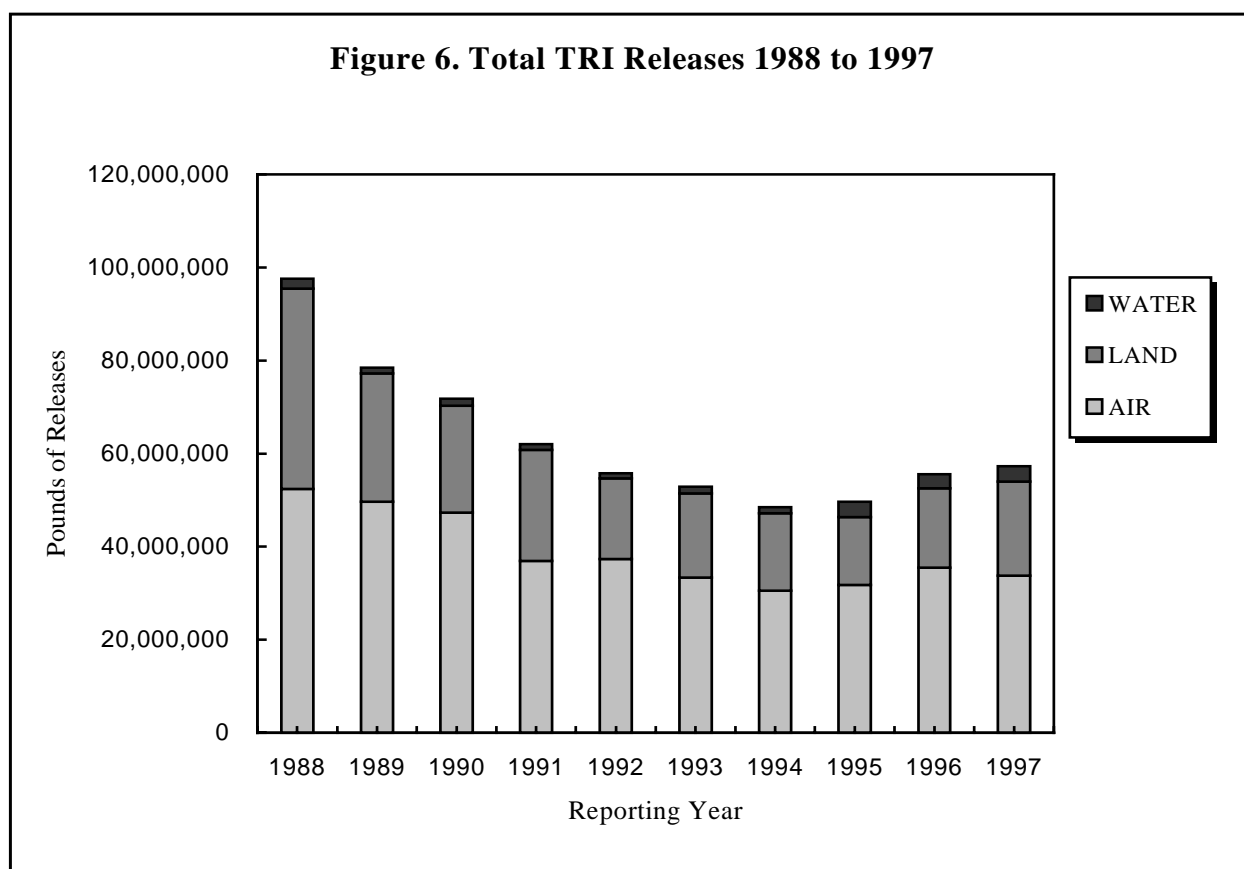
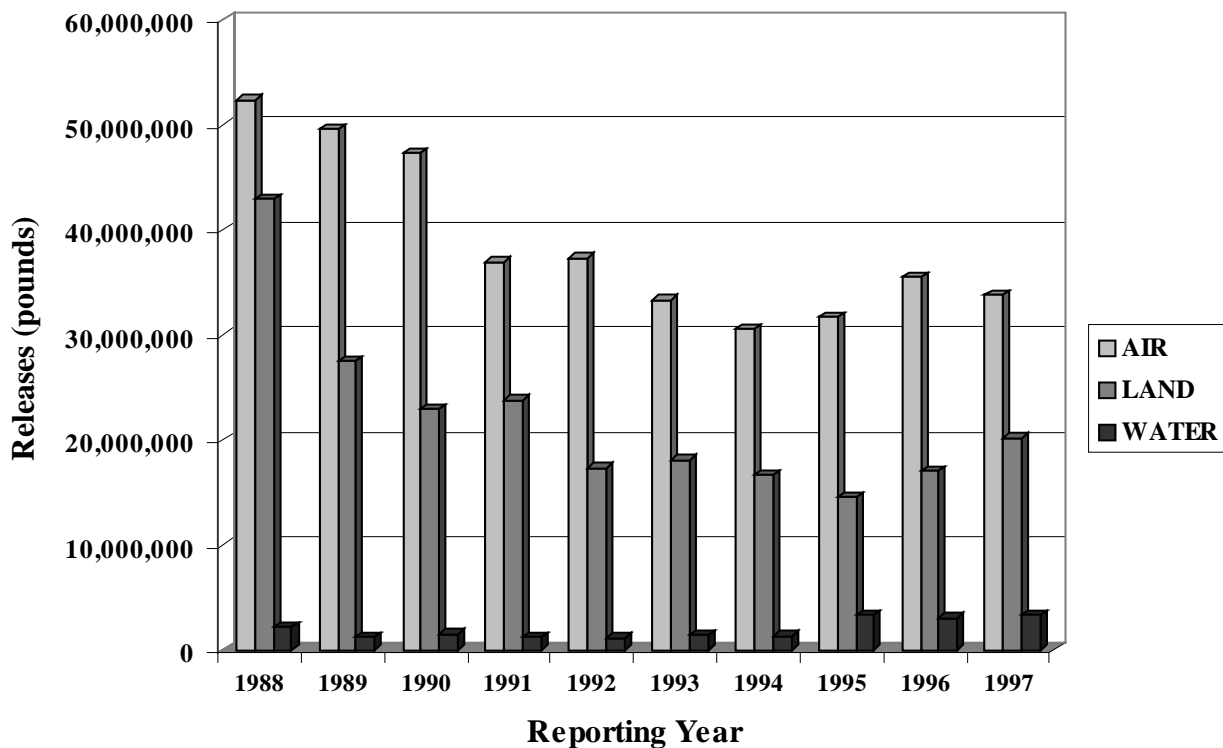


Figure 7. Total TRI Releases by Media - 1988 to 1997



As can be seen in Figure 6, there had been a consistent downward trend up until 1995. That is when the group of 286 chemicals were added to the TRI list of reportable chemicals. This resulted in both an increase in air and water releases, but land releases continued to decrease.

One of the chemicals added in 1995 was the nitrate compounds. This chemical category is reported as water releases and accounts for the approximately two million pound increase between 1994 and 1995. The four percent increase in air releases is attributable to the addition of the other 286 chemicals in 1995.

The increase in air releases between 1995 and 1996 are attributable to the addition of the charcoal industry. As was discussed

previously, the charcoal industries were required to begin reporting their air releases of methanol in 1996. Their releases for 1996 were 6,599,569 pounds. This more than accounts for the 3,720,158 pounds increase in air releases between 1995 and 1996. Actually, this shows there would have been an overall decrease in air releases if the charcoal industries had not been added. Between 1996 and 1997, there was a 4.8 percent decrease in air releases.

Between 1995 and 1997, there has been essentially no change in water releases; however, there was a 5,585,949 pounds increase in land releases. This is a 38.3 percent increase over the 1995 levels.

Examination of the database shows that the land increase is directly attributable to

increases in the reported releases of lead, zinc and copper by the smelting and refining companies of Doe Run and Asarco.

The data show that Doe Run reported a total of 605,603 pounds increase in releases for these three chemicals between 1995 and 1997. Asarco reported an increase of 4,623,404 pounds total for copper, zinc and lead over the same time period. These numbers account for 93.6 percent of the increase in reported land releases.

It is interesting to note that Doe Run had actually shown a decrease in lead releases to the land over this period, in spite of a 35 percent increase in production, based on their reported production ratios. Sometimes the quality of the ores can affect the percent of wastes generated during the smelting operations. This may have been the case with the Asarco Company who showed an overall decrease in production between 1995 and 1997, but showed the larger releases.

In spite of the various reporting increase requirements between 1994 and 1997, there has still been an overall decrease of 41.3 percent in total releases between 1988 and 1997. This is a decrease of 40,311,094 pounds. See Table 19.

The changes in individual chemicals and the companies that have reported the greatest decreases will be highlighted in the next sections.

Chemical Trends 1988 - 1997

Tables 20 and 21 list the chemicals for which the greatest changes in total releases were reported between 1988 and 1998. Table 20 lists the chemicals that had the greatest reductions and Table 21 lists those that had the greatest increases.

Twenty-one chemicals are listed in Table 20. If their totals are added together for 1988 and 1997, the total reduction would amount to 19,135,238 pounds. This is more than the total change mentioned previously. However, the seven chemicals listed in Table 21 show a total overall increase of 9,259,995 pounds. If these two numbers are subtracted the result is 39,875,243 pounds. This value accounts for 98.9 percent of the total decrease reported previously between 1988 and 1997.

Several of these chemicals and the companies that reported the greatest changes were discussed under the section dealing with the top 12 chemicals reported in 1997.

TABLE 19 – Total Releases by Media by Year

Reporting Year	Air	Land	Water	Total Releases
1988	52,411,338	43,011,146	2,179,942	97,602,426
1989	49,648,404	27,574,966	1,262,398	78,602,768
1990	47,342,911	22,964,681	1,519,020	71,826,612
1991	36,960,125	23,829,689	1,230,181	62,019,995
1992	37,328,079	17,338,852	1,115,179	55,782,110
1993	33,356,198	18,101,934	1,438,746	52,896,878
1994	30,551,180	16,631,294	1,305,215	48,487,689
1995	31,778,685	14,585,208	3,282,973	49,646,866
1996	35,498,543	17,033,951	3,008,012	55,540,506
1997	33,788,155	20,171,157	3,332,020	57,291,332

(Units are in pounds.)

TABLE 20 – Chemicals Showing Greatest Reductions, 1988 Through 1997

Chemical Name	Primary Media	Total Releases		Volume Decrease	% Decrease
		1988	1997		
Zinc and Compounds	Land	30,354,126	14,427,247	15,926,879	52.5%
Xylene (Mixed Isomers)	Air	11,046,480	4,362,721	6,683,759	60.5%
Toluene	Air	6,268,144	1,995,570	4,272,574	68.2%
1,1,1-Trichloroethane	Air	3,826,843	40,285	3,786,558	98.9%
Lead and Compounds	Land	8,484,395	4,967,549	3,516,846	41.5%
Dichloromethane	Air	3,461,636	393,052	3,068,584	88.6%
N-Butyl Alcohol	Air	2,392,412	723,116	1,669,296	69.8%
Freon 113	Air	1,526,754	470	1,526,284	100.0%
Methyl Ethyl Ketone	Air	3,288,395	1,835,433	1,452,962	44.2%
Trichloroethylene	Air	1,887,130	622,863	1,264,267	67.0%
n-Hexane****	Air	2,956,701	1,907,774	1,048,927	35.5%
Acetone*	Air	2,505,438	1,456,845	1,048,593	41.9%
Glycol Ethers***	Air	2,852,207	1,835,102	1,017,105	35.7%
Tetrachloroethylene	Air	710,695	102,283	608,412	85.6%
Ammonium Nitrate *****	Water	1,492,007	931,502	560,505	37.6%
Ammonia**	Air/Water	2,210,061	1,671,514	538,547	24.4%
Chloroethane	Air	820,000	439,400	380,600	46.4%
Chloromethane	Air	384,443	29,627	354,816	92.3%
Chromium and Compounds	Land/Air	228,082	37,202	190,880	83.7%
Chloroform Air	Air	221,771	96,094	125,677	56.7%
Nitric Acid	Air/Water	157,908	64,741	93,167	59.0%
	Totals	87,075,628	37,940,390	49,135,238	56.4%

* Acetone was delisted in 1994. (Units are in pounds.)

** Qualified in 1995 to only greater than 10 percent in solution.

*** Changed to category “Certain Glycol Ethers” in 1995, in this table treated as the same.

**** n-Hexane first started reporting in 1995.

***** Reported as nitrate compounds after 1994

TABLE 21 – Chemicals Showing Greatest Increases, 1988 Through 1997

Chemical	Media	Total Releases		Volume Increase	% Of Increase
		1988	1997		
Methanol**	Air	3,196,832	10,020,787	6,823,955	213%
Styrene	Air	279,127	1,236,924	957,797	343%
Ethylbenzene	Air	221,681	732,428	510,747	230%
1,2,4 Trimethylbenzene	Air	13,113	401,090	387,977	2959%
Hydrochloric Acid*	Air	669,500	908,755	239,255	36%
Hydrogen Fluoride	Air	390,412	614,614	224,202	57%
Aluminum (Fume or Dust)	Air	12,150	128,212	116,062	955%
	Totals	4,782,815	14,042,810	9,259,995	194%

* Only aerosol forms reported after 1994 (Units are in pounds.)

** Charcoal industry releases added in 1996.

Two chemicals; however, are especially noteworthy. They are 1,1,1-trichloroethane and freon 113. What is most significant is that the industrial releases of these two chemicals have almost been eliminated.

Both of these chemicals are known to have adverse affects on the earth's ozone layer, and therefore decreased releases of these two chemicals are especially beneficial.

Company Trends 1988-1997

As it is important to note the companies that are the largest reporters of toxics releases, it is also important to note those companies that have shown the greatest changes of reported releases over time. The following tables list the companies that have shown the greatest volume reductions, Table 22, the greatest percent reductions, Table 23, and the greatest increases, Table 24, between 1988 and 1997. There were more companies that showed significant reductions than those listed. A complete list of these companies is provided in Appendix E.

Table 22 is significant because it shows the companies that have reported the greatest volume reductions between 1988 and 1997. These 30 companies account for a total of 42,686,765 pounds of reduced toxic releases. This represents greater than 100 percent of the total reduction reported

between these years. Companies that reported increases will be discussed later.

Note that several of the companies listed in Table 22 have been discussed previously in the sections dealing with the top chemicals reported in 1997. Details about which chemicals were reported by each company would be too extensive for discussion in this report. This information can be supplied upon request.

Table 23 is important to note because these companies have been able to greatly reduce or completely eliminate their releases of toxic chemicals. Exactly how they have been able to accomplish this is not readily available from the TRI data. This is especially true when a company no longer reports, as indicated by the end year prior to 1997. Companies may have completely eliminated the use of a TRI listed chemical, substituted other chemicals, improved or changed their processes, or transferred production processes to other facilities. Regrettably sometimes companies have gone out of business. Regardless of the methods used, operating companies are to be commended for their efforts and their reductions of these releases. More will be discussed about various reduction methods in the Source Reduction section of this report.

TABLE 22 - Top 30 Companies Showing Largest Volume Reductions, 1988 Through 1997*

Company	City	1988 Releases	Start Year	1997 Releases	End Year	Decrease	% Reduction
Doe Run Co.	Herculaneum	28,878,201		8,729,930		20,148,271	69.8%
3M	Nevada	3,765,342		922,115		2,843,227	75.5%
Chrysler Corp.	Fenton (Plt#1)	2,837,403		475,198		2,362,205	83.3%
AP Green	Mexico	1,441,691		18,800		1,422,891	98.7%
Syntex Agribusiness Inc.	Springfield	1,416,412		122,611		1,293,801	91.3%
AT&T	Lee's Summit	1,293,209		12,300	1995	1,280,909	99.0%
Dyno Nobel	Louisiana	1,843,829		874,700		969,129	52.6%
Chrysler Corp.	Fenton (Plt#2)	1,371,329		405,642	1995	965,687	70.4%
GM Truck Group	Wentzville	1,758,390		866,499		891,891	50.7%
Hussman Corp.	Bridgeton	756,379		31,823		724,556	95.8%
Monsanto	St. Louis	726,825		8,979	1996	717,846	98.8%
Canon Steel Corp.	Washington	717,329		0		717,329	100.0%
US DOE	Kansas City	687,038		975		686,063	99.9%
McDonnell Douglas Corp.	St. Louis	812,483		224,272		588,211	72.4%
North American Refractories	Farber	567,652		15		567,637	100.0%
Dayco Products	Springfield	616,250		54,768		561,482	91.1%
KV Pharmaceutical Co.	Creve Coeur	664,499	1989	113,420		551,079	82.9%
Norando Aluminum Inc.	New Madrid	1,154,071		622,998		531,073	46.0%
3M	Columbia	542,850		18,600		524,250	96.6%
Marchem Coated Fabrics	New Haven	530,573		7,617		522,956	98.6%
National Refractories	Mexico	471,244		1,901		469,343	99.6%
Mallinckrodt Chemical	St. Louis	728,327		265,777		462,550	63.5%
Marrion Merrell Dow Inc.	Kansas City	416,991		336	1994	416,655	99.9%
Cook Composites & Polymers	N Kansas City	424,048	1989	21,710		402,338	94.9%
INDRESCO Inc.	Vandalia	393,770		260	1994	393,510	99.9%
Sunbeam Outdoor Products	Neosho	480,280		94,158	1995	386,122	80.4%
3M	Springfield	766,383		404,988		361,395	47.2%
Crane National Vendors	Bridgeton	317,650		0		317,650	100.0%
Litton Co.	Springfield	310,405		7,000		303,405	97.7%
Borden Pkg.	St. Louis	772,600		469,296		303,304	39.3%

* Unless Start or End Year are noted otherwise.

(Units are in pounds.)

TABLE 23 - Companies Showing Largest Percent Reductions, 1988 Through 1997*

Company	City	1988 Releases	1997 Releases	End Year	Decrease	% Reduction
Canon Steel Corp.	Washington	717,329	0		717,329	100.0%
North American Refractories	Farber	567,652	15		567,637	100.0%
Crane National Vendors	Bridgeton	317,650	0		317,650	100.0%
Meramec Industries	Sullivan	282,360	0		282,360	100.0%
Robertson - Ceco	St. Louis	189,450	0	1994	189,450	100.0%
Marathon Electric Mfg.	West Plains	171,195	0		171,195	100.0%
Alco Controls	St. Louis	112,600	5		112,595	100.0%
Modine Mfg. Co.	Joplin	111,084	25		111,059	100.0%
Parker Hannifin Corp.	Kennett	110,350	5		110,345	100.0%
Lever Bros. Co.	Pagedale	101,020	0	1995	101,020	100.0%
Tracker Marine	Lebanon	81,135	1	1996	81,134	100.0%
ABB Power	St. Louis	63,000	0		63,000	100.0%
Valentec Kisco Inc.	Hillsdale	60,793	0	1993	60,793	100.0%
AlliedSignal	Nevada	57,700	0		57,700	100.0%
Dennis Chemical	St. Louis	17,750	5		17,745	100.0%
US DOE	Kansas City	687,038	975		686,063	99.9%
Marrion Merrell Dow Inc.	Kansas City	416,991	336	1994	416,655	99.9%
INDRESCO Inc.	Vandalia	393,770	260	1994	393,510	99.9%
BW Freeman	Owensville - Cuba	147,388	180		147,208	99.9%
Lincoln A. Pentair Co.	St. Louis	195,387	300		195,087	99.8%
Wire Rope Corp.	Kansas City	44,250	100		44,150	99.8%
AB Chance	Centralia	175,200	596		174,604	99.7%
National Refractories	Mexico	471,244	1,901		469,343	99.6%
AT&T	Lee's Summit	1,293,209	12,300	1995	1,280,909	99.0%
Monsanto	St. Louis	726,825	8,979	1996	717,846	98.8%
AP Green	Mexico	1,441,691	18,800		1,422,891	98.7%
Marchem Coated Fabrics	New Haven	530,573	7,617		522,956	98.6%
Litton Co.	Springfield	310,405	7,000		303,405	97.7%
AP Green	Fulton	65,180	1,658		63,522	97.5%
3M	Columbia	542,850	18,600		524,250	96.6%

* Unless End Year is noted otherwise.

(Units are in pounds.)

There have also been several companies that have shown relatively large increases in their reported releases between 1988 and 1997. The companies that showed greater than 100,000 pound increases are listed in Table 24. If these companies started reporting after 1988, their total for 1997

would all show up as an increase when comparing the two years. The total increase by these 21 companies amounts to 8,385,557 pounds. If more details are desired by company or by chemical, contact DNR's, Technical Assistance Program at 1-800-361-4827.

*TABLE 24 - Companies Showing Largest Total Increases 1988 Through 1997**

Company	City	1988 Releases	Start Year	1997 Releases	Increase	% Increase
Missouri Chemical Works	Louisiana	783,360		1,846,900	1,063,540	136%
Ford Motor Co.	Claycomo	1,522,330		2,456,496	934,166	61%
Silgan Containers	St. Joseph	4,000	1989	715,713	711,713	17793%
Biokyowo	Cape Girardeau	14,730		715,682	700,952	4759%
Dyno Nobel	Carthage	139,051		835,877	696,826	501%
Holnam Inc.	Clarksville	4,499		698,578	694,079	15427%
Ag Processing	St. Joseph	50,000		589,000	539,000	1078%
Premium Standard Foods	Milan	755	1994	539,355	538,600	71338%
Plastene Supply Co.	Portageville	227,706		566,751	339,045	149%
Asarco	Annapolis	10,546,740		10,851,238	304,498	3%
ADM	N Kansas City	5		277,763	277,758	5555160%
SAI Automotive	Kansas City	89,677	1996	347,968	258,291	288%
TG USA Corp.	Perryville	39,500	1989	297,580	258,080	653%
Dow Chemical	Pevely	1,176,050		1,348,896	172,846	15%
True Mfg. Co. Inc.	O'Fallon	57,300	1990	210,860	153,560	268%
ADM	Mexico	250		145,314	145,064	58026%
General Electric Co.	Springfield	5,328		138,554	133,226	2500%
Optec OD USA Inc.	Mexico	37,840		162,670	124,830	330%
River Cement Co.	Festus	5,218		123,539	118,321	2268%
Able Body Corp.	Joplin	14,728	1989	133,000	118,272	803%
Tri-Con Industries Ltd.	Columbia	6,545	1991	109,435	102,890	1572%

* Unless Start Year is noted otherwise.

(Units are in pounds.)

SOURCE REDUCTION IN MISSOURI

In 1990, Congress passed the Pollution Prevention Act (PPA). This law established the national policy that the best way to manage pollution was to prevent or reduce the generation of the wastes that cause the pollution. This is known as source reduction. Up until this time most of the environmental laws dealt with managing hazardous wastes or pollution after it was created. The PPA focused on reducing the amount of pollution generated.

The PPA defines sources reduction as any practice that

- reduces the amount of any hazardous substance, pollutant or contaminant entering any waste stream or otherwise released into the environment (including fugitive emissions) prior to recycling, treatment or disposal; and,
- reduces the hazards to public health and the environment associated with the release of such substances, pollutants or contaminants.

The PPA stated that, through source reduction, the risks to people and the environment could be reduced and financial and natural resources could be saved that would otherwise be spent on environmental clean-up or pollution control. Industrial processes could also be made more efficient. Source reduction practices were defined as including modifications in equipment, processes, procedures or technology, reformulation or redesign of products, substitution of raw materials or improvements in maintenance and inventory controls. All of these practices affect the generation of wastes. Management practices, such as recycling, treatment or disposal, that deal with the wastes after they are generated, are not considered source reduction.

Although source reduction is the preferred management method, the PPA recognized that recycling and treatment were viable options when source reduction was not feasible. Thus, the PPA established a hierarchy of waste management options with source reduction first, recycling second and treatment third. Disposal, which is also considered a release to the environment, is viewed only as a last resort, to be employed only if the preferred methods cannot be used. The PPA did not specifically address the combustion of wastes for energy recovery. However, because this option has beneficial aspects similar to recycling or treatment, EPA chose to list this activity in the waste management hierarchy. Energy recovery is preferred over treatment. Figure 8 illustrates the waste management hierarchy used in the TRI.

The PPA requires that facilities report the quantities of wastes they are managing both on and off-site. This information is reported in Section 8 of the TRI Form R. (See Appendix A.) The PPA requires industries report the quantities of wastes managed in the current reporting year, the previous year and projections for the two following years. The PPA requires the data projection to encourage facilities to consider their future waste generation, opportunities for source reduction and potential improvements in waste management options. Future-year estimates are not commitments that facilities reporting to the TRI must meet.

Source Reduction Quantities

Table 25 shows the data provided for the 1997 reporting year. The release quantity reported here is greater than that shown previously in Tables 2 and 19. This, in part, is due to the fact that quantities sent off-site

for disposal are included as releases in this table.

Examination of these quantities shows that there is a projected decrease in wastes managed in every category except on-site recycling. This is in accordance with the intent of the Pollution Prevention Act. Thus, based on this data, the total amount of wastes managed is projected to decrease through the 1999 reporting year, while on-site recycling is projected to continue to increase.

Source Reduction Methods

The PPA also required that companies report what types of methods they are using to achieve or implement source reduction. In 1997, 108 companies reported some type of source reduction activity. This is 19.5 percent of the total number of companies that reported Form R's for that year, which was 553. From these 108 companies, there were 308 reports received that showed 25 different activity codes. These activity codes applied to 93 different chemicals. Table 26 lists the activity codes most frequently reported and their descriptions. It also denotes the number of companies that reported each activity code.

The codes shown in Table 26 are those provided by EPA for use by the reporting facilities. A complete list of the available codes is provided in Appendix G. These codes are divided into the following eight different categories:

	<u>Codes</u>
1. Good Operating Procedures	W13 – W19
2. Inventory Control	W21 – W29
3. Spill And Leak Prevention	W31 – W39
4. Raw Material	
Modifications	W41 – W49
5. Process Modification	W51 – W58
6. Cleaning and Degreasing	W59 – W71

7. Surface Preparation and	
Finishing	W72 – W78
8. Product Modification	W81 – W89

All of these categories and codes describe practices that were defined by the PPA as source reduction. However, some of these methods could be considered preferred over others because they are more efficient or effective at reducing the amount of toxic chemicals being released to the environment. Examples of these would be "Substitute raw materials" (W42) and "Modified design or composition of product" (W82). These methods reduce or eliminate the amounts of toxic releases by reducing or eliminating the use of a toxic chemical; therefore, less is released to the environment.

The TRI does not directly quantify how much reduction of releases is produced by implementation of these source reduction methods. We only have the overall release trends. These were looked at previously and will be discussed further in the next section.

It is interesting to note that only three companies reported the source reduction code W35, "Installed vapor recovery systems," yet this accounted for a high percentage of the reduction methods reported. One company, Continental Cement Company, in Hannibal, MO, reported this source reduction method for 43 different chemicals. This is not unrealistic because this company burns a large volume of waste solvents as fuel for their cement manufacturing process. A single vapor recovery system could be used to capture emissions from all of the chemicals they manage. This could have a significant impact on their releases. More will be discussed concerning cement manufacturers in the Source Reduction Trends section.

Figure 8 - Waste Management Hierarchy

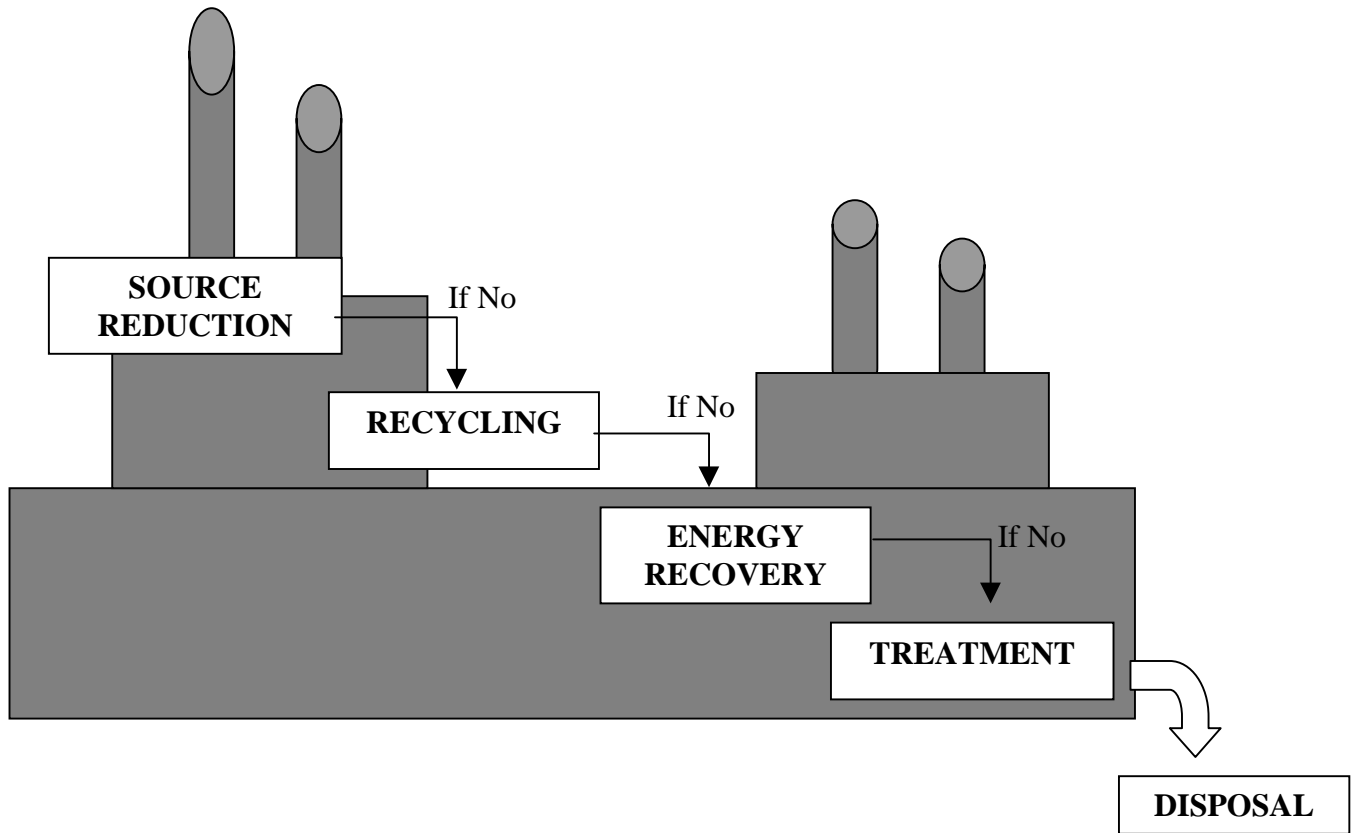


TABLE 25 - Current and Projected Quantities of TRI Chemicals Managed as Wastes 1997 – 1999

Waste Management Activity	Current Year 1997	Projected 1998	Projected 1999
Recycled On-site	230,087,696	238,584,045	244,854,548
Recycled Off-site	63,356,210	56,448,235	56,815,318
Energy Recovery On-site	98,456,987	92,890,656	92,919,654
Energy Recovery Off-site	22,336,016	16,064,221	15,664,996
Treatment On-site	70,018,071	66,973,682	68,128,901
Treatment Off-site	14,861,872	14,804,210	14,427,422
Quantity Releases On- and Off-site	61,515,495	60,724,259	58,334,948
Total Reduction – Related Wastes	560,932,347	545,853,308	551,145,787

(Units in pounds.)

TABLE 26 - Most Frequently Reported Activity Codes – 1997

Code	No. of Times Referred	% of Total Waste Codes	Code Description	No. of Companies
W19	61	19.8%	Other changes in operating practices.	18
W35	46	14.9%	Installed vapor recovery systems	3
W13	35	11.4%	Improved maintenance scheduling, record keeping or procedures	16
W42	28	9.1%	Substituted raw materials	13
W52	26	8.4%	Modified equipment, layout or piping	8
W58	16	5.2%	Other process modifications	8
W82	13	4.2%	Modified design or composition of product	4
W21	10	3.2%	Instituted procedures to insure materials do not stay in inventory beyond shelf life	4
W14	9	2.9%	Changed production schedule to minimize equipment and feedstock changeovers	3
W32	9	2.9%	Improved procedures for loading, unloading and transfer operations	2

Source Reduction Trends

In a previous section, we looked at the source reduction quantities for 1997 and the projected values for two future years, 1998 and 1999. Table 27 shows the actual reported values from Section 8 of the TRI for all years since 1991.

An initial look at the overall numbers indicates that the total production related wastes managed have decreased. A reduction in the total wastes managed would indicate that companies have reduced the use of toxic chemicals, thereby reducing the potential for pollution. The reduced use of toxic chemicals would also benefit the community from a reduced risk of exposure through accidental spills that could occur during handling or transport. However, this apparent reduction may not actually be the case, as will be discussed in more detail shortly.

Also, the on and off-site releases have also decreased. The releases data does show a low in 1995, and then increases for 1996 and

1997. The reasons for this were discussed earlier and are due to the addition of the 286 new chemicals and chemical categories (most notably nitrate compounds) in 1995 and the addition of the charcoal industry (methanol emissions) in 1996.

The data also shows a continued and steady increase in on and off-site recycling. This is a desirable trend because it conserves resources and prevents these chemicals from being lost through releases or waste disposal.

Non-Production Related Changes

However, there are two other large changes that should be noted. One is the sharp drop in reported on-site energy recovery between 1994 and 1995 and the decrease in on and off-site treatment between 1993 and 1994, and 1994 and 1995, respectively. These changes significantly affect the total wastes managed and may not reflect actual decreases, as will be discussed.

On-Site Energy Recovery:

Examination of the data shows there are four cement manufacturers that report over 95 percent of all the on-site energy recovery. These companies burn waste solvents and TRI chemicals as fuel for their cement manufacturing process. They receive these chemicals as wastes from other manufacturing companies throughout the United States.

Prior to 1995, the River Cement Company, in Festus, MO, was reporting two generic categories of chemicals at quantities between 100 to 130 million pounds. In 1996 they were required by EPA to begin documenting the quantities of the individual TRI chemicals they received and burned. Between 1994 and 1995 their reported quantities dropped from 129.0 million to 29.4 million pounds. Initially, it appeared the difference was due to improved tracking and counting methods. However, further investigation revealed that River Cement was continuing to burn the same total volume of wastes, but it was found that they could only identify or confirm a small percentage of the wastes as individual TRI chemicals. Many wastes were shipped as a mixture and only identified by a general waste code. Therefore, based on EPA requirements, they could no longer report all of their wastes as TRI chemicals.

The Holnam Company, another cement manufacturer burning waste materials as a fuel source, in Clarksville, MO, also showed a significant drop between 1994 and 1995. They had tracked their individual TRI chemicals for all years; however, their change was due to the delisting of acetone in 1994 by EPA. Prior to 1994, Holnam reported between 10 and 14 million pounds of acetone. After 1993, they were no longer required to report for acetone. However, this only accounts for about 20 percent of

the decrease reported. Decreases in quantities of TRI chemicals reported as burned for energy recovery could be positive indicators of source reduction by the companies shipping wastes to the cement kilns.

Cement manufacturers burn these TRI chemicals at very high temperatures, between 2500 and 3500 F., in what is known as a cement kiln. These kilns are strictly regulated by EPA and DNR. The cement kilns are continuously monitored to insure their destruction efficiency is maintained at 99.99 percent. This means that only 0.01 percent of the wastes being burned could be released as a pollutant. In other words, if 100,000,000 pounds of toluene are burned, only 1,000 pounds could potentially be released as toluene.

However, this does not mean that cement kilns are completely clean burning. All combustion processes can create products of incomplete combustion (PICs), which often include dioxins. However, all of the cement kilns in Missouri that burn hazardous wastes, have completed risk assessment studies and have met all of the health risk criteria set by EPA. These studies show that there are no adverse health risks posed by the cement kilns burning hazardous waste fuels.

If you have further questions concerning burning of hazardous wastes in cement kilns, contact DNR's Technical Assistance Program at 1-800-361-4827 or (573) 526-6627, or the Hazardous Waste Program, Permit Section, (573) 751-3176.

TABLE 27 - Total Wastes Managed by Year as Reported in Section 8 of the TRI

	On & Off-Site Releases*	On-Site Waste Management			Off-Site Waste Management			Total Production Related Wastes
		Recycle	Energy Recovery	Treatment	Recycle	Energy Recovery	Treatment	
1991	68,470,093	186,937,970	267,416,032	100,685,252	46,607,966	9,561,081	24,709,580	704,387,974
1992	58,401,630	137,867,384	251,191,980	101,788,068	165,065,483	9,602,118	28,679,543	752,596,206
1993	57,504,066	161,650,158	229,861,700	103,100,681	49,363,633	17,972,079	28,783,487	648,235,804
1994	52,850,834	220,758,719	259,913,210	86,114,343	64,978,536	16,933,090	30,345,091	731,893,823
1995	52,133,240	185,630,783	94,009,432	77,171,153	58,020,116	26,906,658	13,329,863	507,201,245
1996	59,126,923	177,502,324	79,482,408	72,012,544	59,989,152	27,006,551	11,964,685	487,084,587
1997	61,515,495	230,087,696	98,456,987	70,018,071	63,356,210	22,336,016	14,861,872	560,632,347

* These releases include off-site transfers for disposal.

Treatment Reporting Changes:

The other area of concern was the decreases noted for the on and off-site treatment quantities in Table 27. There were sharp drops between 1993 and 1994 for the on-site treatment and between 1994 and 1995 for the off-site treatment. The reason for examining this data is because it shows a significant shift and may not be due to actual reductions of wastes managed.

Examination of the data shows that there were large shifts in the reported quantities for three chemicals during these time periods. One was ammonia. In 1995, the reporting requirement for ammonia changed so that only 10 percent of aqueous forms were now reportable. Review of the data shows that the quantity of ammonia shipped off-site for treatment dropped from 19.0 million in 1994, to 1.9 million in 1995. This 17 million pound decrease is the change seen in Table 27 for off-site treatment.

The other two chemicals with large shifts were sulfuric acid and hydrochloric acid. In 1994, sulfuric acid was modified so that only fuming or aerosol forms were now required to be reported. In 1995, hydrochloric acid was modified in the same way. Review of the data shows there were significant decreases in the reported on-site treatment of both of these acids between 1993 and 1996. (It appears that facilities may not have immediately been aware of how this definition change affected their reporting requirements.) The total change for both acids between 1993 and 1996 was 38.9 million pounds. This more than accounts for the change of 31.1 million pounds shown in Table 27.

It appears the reported decreases in the on- and off-site treatment quantities was due to changes in the reporting requirements and

not due to changes in actual wastes managed.

Source Reduction Trends Summary

Combining the accounting variation by the River Cement Company and the reporting changes described above have the affect of equalizing the values for the total production-related wastes managed between 1991 and 1997. Thus, it cannot be concluded that there is a true downward trend in the quantities of total wastes managed. Nor can it be stated that companies have actually reduced the quantities of toxic chemicals being used or managed. However, it can be stated that the amount of pollution being generated is being reduced. This is reflected in the decreased on- and off-site releases.

It can be concluded that more wastes are being managed in a beneficial way, as reflected by the increased on- and off-site recycling quantities. On- and off-site energy recovery is also a beneficial use of hazardous chemicals that otherwise would have to be treated or disposed of.

Source Reduction Method Trends

Table 28 shows the trends in the reported source reduction activities as reported since 1991. As could be expected, the overall numbers have been decreasing. This is to be expected because it typically becomes more difficult over time to find additional ways to reduce wastes. Many companies may have been doing source reduction activities prior to 1991. This information was first required to be reported in 1991.

The intent of source reduction as defined by the PPA is to reduce the amount of a toxic chemical from entering a waste stream or being released to the environment. The overall trends in reduced annual releases

discussed previously indicate that companies are reducing the sources of pollution.

In some states, source reduction is further defined to mean the reduced use of toxic chemicals. One way to do this is through substitution of raw materials with less toxic materials. Substitution of raw materials is source activity code number W42. This has been reported as one of the top four activity codes in Missouri for all years since 1991. (See Table 28.) Another way companies can reduce the use of toxic chemicals is by

modifying the design or composition of their product. This is activity code W82. This was also one of the top four codes in Missouri for two of the reporting years.

A list of the top 12 source reduction methods summarized from all years is presented in Table 29. The most prevalent activities were the good operating practices of W13 and W19. But again, W42, substitution of raw materials, showed a relatively large percentage.

TABLE 28 – Source Reduction Method Trends

Year	No. of Reports	% of Total*	No. of Companies	% of Total*	No. of Chemicals	No. of Activity Codes	Top Four Codes			
							1	2	3	4
1991	583	26.3	206	32.5	101	36	W13	W42	W19	W31
1992	490	23.5	195	31.7	84	33	W13	W15	W42	W52
1993	463	23.0	201	33.3	82	32	W13	W19	W42	W52
1994	368	19.7	174	30.0	79	33	W13	W19	W42	W58
1995	296	15.6	140	24.6	75	28	W13	W19	W42	W82
1996	306	16.7	135	24.6	79	28	W13	W19	W42	W82
1997	308	16.4	108	19.5	93	25	W19	W35	W13	W42

* These are the percents of the total number of reports submitted and total number of companies that reported for that year, respectively.

TABLE 29 – Top 12 Source Reduction Activity Codes Reported for all Years, 1991 – 1997

Activity Code	Total Times Reported	% of Total	Code Description
W13	444	15.8%	Improved maintenance scheduling, record keeping or procedures
W19	404	14.4%	Other changes in operating procedures
W42	325	11.6%	Substituted raw materials
W52	191	6.8%	Modified equipment, layout or piping
W58	155	5.5%	Other process modifications
W14	129	4.6%	Changed production schedule to minimize equipment and feedstock changeovers
W31	112	4.0%	Improved storage or stacking procedures
W39	91	3.2%	Other changes made in spill and leak prevention
W21	88	3.1%	Instituted procedures to insure materials do not stay in inventory beyond shelf life
W36	85	3.0%	Implemented inspection or monitoring program of potential spill or leak sources
W82	84	3.0%	Modified design or composition of products
W73	83	3.0%	Substituted coating materials used

SUMMARY

Chemicals are a part of our lives. We use chemicals in our homes, in our cars and in our factories. Environmental regulations and public safety standards offer protection, but they cannot guarantee that everyone will be safe from chemical exposures that might harm them. Individuals are also not equally exposed to chemical hazards. Workers in some occupations, people who live in towns surrounded by large manufacturing plants and those who live near industrial areas have different levels of risk. Community tragedies like the deadly cloud of methyl isocyanate that killed thousands in Bhopal, India, in 1984 underscore the dangers of adjoining industrial and residential areas and the importance of community emergency plans. Becoming knowledgeable about the chemicals that are used or transported in our communities is equally as important. Although the TRI covers a limited range of chemicals and industry, it does provide an invaluable tool, creating a starting point for citizens and industries to look at the toxins dispersed and transported in their neighborhoods. Many communities across the nation have used the TRI to open dialogues with industry and regulators, often resulting in actions to cut emissions.

The TRI data can be used in many ways, as long as the limitations of the data are understood. Many uses and ways of looking at the TRI data have been presented in this report. It is hoped that the information that has been presented will help Missouri citizens better understand the chemical hazards that may be present in their communities. It is also hoped that this information will help citizens understand what manufacturing companies are doing to help minimize their exposure, and to help them initiate the dialogue needed to make future changes.

APPENDIX A

TOXIC CHEMICAL RELEASE INVENTORY REPORTING FORM



FORM R

**EPA**United States
Environmental Protection
Agency**FORM R****TOXIC CHEMICAL RELEASE
INVENTORY REPORTING FORM**Section 313 of the Emergency Planning and Community Right-to-Know Act of 1986,
also known as Title III of the Superfund Amendments and Reauthorization Act**WHERE TO SEND COMPLETED FORMS:** 1. EPCRA Reporting Center
P.O Box 3348
Merrifield, VA 22116-3348
ATTN: TOXIC CHEMICAL RELEASE INVENTORY
2. APPROPRIATE STATE OFFICE
(See instructions in Appendix F)Enter "X" here if this
is a revision

For EPA use only

Important: See instructions to determine when "Not Applicable (NA)" boxes should be checked.**PART I. FACILITY IDENTIFICATION INFORMATION****SECTION 1. REPORTING YEAR** _____**SECTION 2. TRADE SECRET INFORMATION**

2.1	Are you claiming the toxic chemical identified on page 2 trade secret?		2.2	Is this copy <input type="checkbox"/> Sanitized <input type="checkbox"/> Unsanitized	
	<input type="checkbox"/> Yes (Answer question 2.2; Attach substantiation forms)	<input type="checkbox"/> No (Do not answer 2.2; Go to Section 3)		(Answer only if "YES" in 2.1)	

SECTION 3. CERTIFICATION (Important: Read and sign after completing all form sections.)

I hereby certify that I have reviewed the attached documents and that, to the best of my knowledge and belief, the submitted information is true and complete and that the amounts and values in this report are accurate based on reasonable estimates using data available to the preparers of this report.

Name and official title of owner/operator or senior management official:

Signature:

Date Signed:

SECTION 4. FACILITY IDENTIFICATION

4.1	Facility or Establishment Name	TRI Facility ID Number	Facility or Establishment Name or Mailing Address(if different from street address)
	Street	Mailing Address	
	City/County/State/Zip Code	City/County/State/Zip Code	

4.2	This report contains information for: (Important : check a or b; check c if applicable)	a. <input type="checkbox"/> An entire facility	b. <input type="checkbox"/> Part of a facility	c. <input type="checkbox"/> A Federal facility
------------	--	--	--	--

4.3	Technical Contact Name	Telephone Number (include area code)
------------	------------------------	--------------------------------------

4.4	Public Contact Name	Telephone Number (include area code)
------------	---------------------	--------------------------------------

4.5	SIC Code (s) (4 digits)	Primary	b.	c.	d.	e.	f.
		a.					

4.6	Latitude	Degrees	Minutes	Seconds	Longitude	Degrees	Minutes	Seconds

4.7	Dun & Bradstreet Number(s) (9 digits)	4.8	EPA Identification Number (RCRA I.D. No.) (12 characters)	4.9	Facility NPDES Permit Number(s) (9 characters)	4.10	Underground Injection Well Code (UIC) I.D. Number(s) (12 digits)
------------	---------------------------------------	------------	---	------------	--	-------------	--

a.	a.	a.	a.
b.	b.	b.	b.

SECTION 5. PARENT COMPANY INFORMATION

5.1	Name of Parent Company	NA <input type="checkbox"/>
------------	------------------------	-----------------------------

5.2	Parent Company's Dun & Bradstreet Number	NA <input type="checkbox"/>
------------	--	-----------------------------

EPA FORM R

PART II. CHEMICAL-SPECIFIC INFORMATION

TRI Facility ID Number

Toxic Chemical, Category or Generic Name

SECTION 1. TOXIC CHEMICAL IDENTITY

(Important: DO NOT complete this section if you completed Section 2 below.)

1.1 CAS Number (Important: Enter only one number exactly as it appears on the Section 313 list. Enter category code if reporting a chemical category.)

1.2 Toxic Chemical or Chemical Category Name (Important: Enter only one name exactly as it appears on the Section 313 list.)

1.3 Generic Chemical Name (Important: Complete **only** if Part 1, Section 2.1 is checked "yes". Generic Name must be structurally descriptive.)

SECTION 2. MIXTURE COMPONENT IDENTITY

(Important: DO NOT complete this section if you completed Section 1 above.)

2.1 Generic Chemical Name Provided by Supplier (Important: Maximum of 70 characters, including numbers, letters, spaces, and punctuation.)

SECTION 3. ACTIVITIES AND USES OF THE TOXIC CHEMICAL AT THE FACILITY

(Important: Check all that apply.)

3.1 Manufacture the toxic chemical:**3.2** Process the toxic chemical:**3.3** Otherwise use the toxic chemical:

a. ☐ Produce b. ☐ Import

If produce or import:

c. ☐ For on-site use/processingd. ☐ For sale/distributione. ☐ As a byproductf. ☐ As an impuritya. ☐ As a reactantb. ☐ As a formulation componentc. ☐ As an article componentd. ☐ Repackaginga. ☐ As a chemical processing aidb. ☐ As a manufacturing aidc. ☐ Ancillary or other use**SECTION 4. MAXIMUM AMOUNT OF THE TOXIC CHEMICAL ONSITE AT ANY TIME DURING THE CALENDAR YEAR**

4.1 (Enter two-digit code from instruction package.)

SECTION 5. QUANTITY OF THE TOXIC CHEMICAL ENTERING EACH ENVIRONMENTAL MEDIUM ONSITE

		A. Total Release (pounds/year) (Enter range code or estimate*)	B. Basis of Estimate (enter code)	C. % From Stormwater
5.1	Fugitive or non-point air emissions	NA <input type="checkbox"/>		
5.2	Stack or point air emissions	NA <input type="checkbox"/>		
5.3	Discharges to receiving streams or water bodies (enter one name per box)			
Stream or Water Body Name				
5.3.1				
5.3.2				
5.3.3				
5.4.1	Underground Injection onsite to Class I Wells	NA <input type="checkbox"/>		
5.4.2	Underground Injection onsite to Class II-V Wells	NA <input type="checkbox"/>		

If additional pages of Part II, Section 5.3 are attached, indicate the total number of pages in this box and indicate the Part II, Section 5.3 page number in this box. (example: 1,2,3, etc.)

EPA FORM R PART II. CHEMICAL - SPECIFIC INFORMATION (CONTINUED)	TRI Facility ID Number Toxic Chemical, Category or Generic Name
--	--

SECTION 5. QUANTITY OF THE TOXIC CHEMICAL ENTERING EACH ENVIRONMENTAL MEDIUM ONSITE (Continued)

		NA	A. Total Release (pounds/year) (enter range code* or estimate)	B. Basis of Estimate (enter code)
5.5	Disposal to land onsite			
5.5.1A	RCRA Subtitle C landfills	<input type="checkbox"/>		
5.5.1B	Other landfills	<input type="checkbox"/>		
5.5.2	Land treatment/application farming	<input type="checkbox"/>		
5.5.3	Surface Impoundment	<input type="checkbox"/>		
5.5.4	Other disposal	<input type="checkbox"/>		

SECTION 6. TRANSFERS OF THE TOXIC CHEMICAL IN WASTES TO OFF-SITE LOCATIONS
6.1 DISCHARGES TO PUBLICLY OWNED TREATMENT WORKS (POTWs)
6.1.A Total Quantity Transferred to POTWs and Basis of Estimate

6.1.A.1. Total Transfers (pounds/year) (enter range code* or estimate)	6.1.A.2 Basis of Estimate (enter code)

6.1.B. ____	POTW Name						
POTW Address							
City		State		County		Zip	

6.1.B. ____	POTW Name						
POTW Address							
City		State		County		Zip	

If additional pages of Part II, Section 6.1 are attached, indicate the total number of pages

 in this box and indicate the Part II, Section 6.1 page number in this box (example: 1,2,3, etc.)

SECTION 6.2 TRANSFERS TO OTHER OFF-SITE LOCATIONS

6.2. ____ Off-Site EPA Identification Number (RCRA ID No.)	
Off-Site Location Name	
Off-Site Address	
City	
State	
County	
Zip	
Is location under control of reporting facility or parent company? <input style="width: 40px;" type="checkbox"/> Yes <input style="width: 40px;" type="checkbox"/> No	

EPA FORM R

PART II. CHEMICAL-SPECIFIC INFORMATION (CONTINUED)

TRI Facility ID Number

Toxic Chemical, Category or Generic Name

SECTION 6.2 TRANSFERS TO OTHER OFF-SITE LOCATIONS (Continued)

A. Total Transfers (pounds/year) (enter range code* or estimate)	B. Basis of Estimate (enter code)	C. Type of Waste Treatment/Disposal/ Recycling/Energy Recovery (enter code)
1.	1.	1. M
2.	2.	2. M
3.	3.	3. M
4.	4.	4. M

6.2. ___ Off-Site EPA Identification Number (RCRA ID No.)

Off-Site location Name

Off-Site Address

City

State

County

Zip

Is location under control of reporting facility or parent company?

☐ Yes☐ No

A. Total Transfers (pounds/year) (enter range code* or estimate)	B. Basis of Estimate (enter code)	C. Type of Waste Treatment/Disposal/ Recycling/Energy Recovery (enter code)
1.	1.	1. M
2.	2.	2. M
3.	3.	3. M
4.	4.	4. M

SECTION 7A. ON-SITE WASTE TREATMENT METHODS AND EFFICIENCY

☐

Not Applicable (NA) - Check here if no on-site waste treatment is applied to any waste stream containing the toxic chemical or chemical category.

a. General Waste Stream (enter code)	b. Waste Treatment Method(s) Sequence [enter 3-character code(s)]	c. Range of Influent Concentration	d. Waste Treatment Efficiency Estimate	e. Based on Operating Data ?
7A.1a	7A.1b	7A.1c	7A.1d	7A.1e
	1			
	2			
	3			
	4			
	5			
	6			
	7			
	8			
			%	Yes <input type="checkbox"/> No <input type="checkbox"/>
7A.2a	7A.2b	7A.2c	7A.2d	7A.2e
	1			
	2			
	3			
	4			
	5			
	6			
	7			
	8			
			%	Yes <input type="checkbox"/> No <input type="checkbox"/>
7A.3a	7A.3b	7A.3c	7A.3d	7A.3e
	1			
	2			
	3			
	4			
	5			
	6			
	7			
	8			
			%	Yes <input type="checkbox"/> No <input type="checkbox"/>
7A.4a	7A.4b	7A.4c	7A.4d	7A.4e
	1			
	2			
	3			
	4			
	5			
	6			
	7			
	8			
			%	Yes <input type="checkbox"/> No <input type="checkbox"/>
7A.5a	7A.5b	7A.5c	7A.5d	7A.5e
	1			
	2			
	3			
	4			
	5			
	6			
	7			
	8			
			%	Yes <input type="checkbox"/> No <input type="checkbox"/>

If additional pages of Part II, Section 6.2/7A are attached, indicate the total number of pages in this box and indicate the Part II, Section 6.2/7A page number in this box : (example: 1,2,3, etc)

EPA FORM R**PART II. CHEMICAL-SPECIFIC INFORMATION (CONTINUED)**

TRI Facility ID Number

Toxic Chemical, Category or Generic Name

SECTION 7B. ON-SITE ENERGY RECOVERY PROCESSES☐

Not Applicable (NA) -

Check here if no on-site energy recovery is applied to any waste stream containing the toxic chemical or chemical category.

Energy Recovery Methods [enter 3-character code(s)]

1

2

3

4

SECTION 7C. ON-SITE RECYCLING PROCESSES☐

Not Applicable (NA) - Check here if no on-site recycling is applied to any waste

stream containing the toxic chemical or chemical category.

Recycling Methods [enter 3-character code(s)]

1.

2.

3.

4.

5.

6.

7.

8.

9.

10.

SECTION 8. SOURCE REDUCTION AND RECYCLING ACTIVITIES

		Column A Prior Year (pounds/year)	Column B Current Reporting Year (pounds/year)	Column C Following Year (pounds/year)	Column D Second Following Year (pounds/year)
8.1	Quantity released **				
8.2	Quantity used for energy recovery onsite				
8.3	Quantity used for energy recovery offsite				
8.4	Quantity recycled onsite				
8.5	Quantity recycled offsite				
8.6	Quantity treated onsite				
8.7	Quantity treated offsite				
8.8	Quantity released to the environment as a result of remedial actions, catastrophic events, or one-time events not associated with production processes (pounds/year)				
8.9	Production ratio or activity index				
8.10	Did your facility engage in any source reduction activities for this chemical during the reporting year? If not, enter "NA" in Section 8.10.1 and answer Section 8.11.				
	Source Reduction Activities [enter code(s)]	Methods to Identify Activity (enter codes)			
8.10.1		a.	b.	c.	
8.10.2		a.	b.	c.	
8.10.3		a.	b.	c.	
8.10.4		a.	b.	c.	
8.11	Is additional information on source reduction, recycling, or pollution control activities included with this report ? (Check one box)			YES <input type="checkbox"/>	NO <input type="checkbox"/>

** Report releases pursuant to EPCRA Section 329(8) including *any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, or disposing into the environment." Do not include any quantity treated onsite or offsite.

APPENDIX B

STANDARD INDUSTRIAL CLASSIFICATION CODES

Appendix B

STANDARD INDUSTRIAL CLASSIFICATION CODES

10 Metal Mining (except 10 11, 1081 and 1094)

- 1021 Copper Ores
- 1031 Lead and Zinc Ores
- 1041 Gold Ores
- 1044 Silver Ores
- 1061 Ferroalloy Ores, Except Vanadium
- 1099 Miscellaneous Metal Ores, Not Elsewhere Classified

12 Coal Mining (except 1241)

- 1221 Bituminous Coal and Lignite Surface Mining
- 1222 Bituminous Coal Underground Mining
- 1231 Anthracite Mining

20 Food and Kindred Products

- 2011 Meat packing plants
- 2013 Sausages and other prepared meat products
- 2015 Poultry slaughtering and processing
- 2021 Creamery butter
- 2022 Natural, processed, and imitation cheese
- 2023 Dry, condensed and evaporated dairy products
- 2024 Ice cream and frozen desserts
- 2026 Fluid milk
- 2032 Canned specialties
- 2033 Canned fruits, vegetables, preserves, jams and jellies
- 2034 Dried and dehydrated fruits, vegetables, and soup mixes
- 2035 Pickled fruits and vegetables, vegetable sauces and seasonings and salad dressings
- 2037 Frozen fruits, fruit juices and vegetables
- 2038 Frozen specialties, n.e.c.*
- 2041 Flour and other grain mill products
- 2043 Cereal breakfast foods
- 2044 Rice milling
- 2045 Prepared flour mixes and doughs
- 2046 Wet corn milling
- 2047 Dog and cat food
- 2048 Prepared feeds and feed ingredients for animals and fowls, except dogs and cats
- 2051 Bread and other bakery products, except cookies and crackers
- 2052 Cookies and crackers
- 2053 Frozen bakery products, except bread
- 2061 Cane sugar, except refining
- 2062 Cane sugar refining
- 2063 Beet sugar
- 2064 Candy and other confectionery products

- 2066 Chocolate and cocoa products
- 2067 Chewing gum
- 2068 Salted and roasted nuts and seeds
- 2074 Cottonseed oil mills
- 2075 Soybean oil mills
- 2076 Vegetable oil mills, n.e.c.*
- 2077 Animal and marine fats and oils
- 2079 Shortening, table oils, margarine, other edible fats and oils, n.e.c.*
- 2082 Malt beverages
- 2083 Malt
- 2084 Wines, brandy, and brandy spirits
- 2085 Distilled and blended liquors
- 2086 Bottled and canned soft drinks and carbonated waters
- 2087 Flavoring extracts and flavoring syrups, n.e.c.*
- 2091 Canned and cured fish and seafoods
- 2092 Prepared fresh or frozen fish and seafoods
- 2095 Roasted coffee
- 2096 Potato chips, corn chips, and similar snacks
- 2097 Manufactured ice
- 2098 Macaroni, spaghetti, vermicelli and noodles
- 2099 Food preparations, n.e.c.*

21 Tobacco Products

- 2111 Cigarettes
- 2121 Cigars
- 2132 Chewing and smoking tobacco and snuff
- 2141 Tobacco stemming and redrying

22 Textile Mill Products

- 2211 Broadwoven fabric mills, cotton
- 2221 Broadwoven fabric inills, manmade fiber and silk
- 2231 Broadwoven fabric mills, wool (including dyeing and finishing)
- 2241 Narrow fabric and other small wares mills: cotton, wool, silk, and manmade fiber
- 2251 Women's full length and knee length hosiery, except socks
- 2252 Hosiery, n.e.c.*
- 2253 Knit outerwear mills
- 2254 Knit underwear and nightwear mills
- 2257 Weft knit fabric mills
- 2258 Lace and warp knit fabric mills
- 2259 Knitting mills, n.e.c.*
- 2261 Finishers of Broadwoven fabrics of cotton
- 2262 Finishers of Broadwoven fabrics of manmade fiber and silk
- 2269 Finishers of textiles, n.e.c.*
- 2273 Carpets and rugs

- 2281 Yarn spinning nulls
- 2282 Yarn texturizing, throwing, twisting and winding mills
- 2284 Thread mills
- 2295 Coated fabrics, not rubberized
- 2296 Tire cord and fabrics
- 2297 Nonwoven fabrics
- 2298 Cordage and twine
- 2299 Textile goods, n.e.c.*

23 Apparel and Other Finished Products made from Fabrics and Other Similar Materials

- 2311 Men's and boys' suits, coats and overcoats
- 2321 Men's and boys' shirts, except work shirts
- 2322 Men's and boys' underwear and nightwear
- 2323 Men's and boys' neckwear
- 2325 Men's and boys' separate trousers and slacks
- 2326 Men's and boys' work clothing
- 2329 Men's and boys' clothing, n.e.c.*
- 2331 Women's, misses' and juniors' blouses and shirts
- 2335 Women's, misses' and juniors' dresses
- 2337 Women's, misses' and juniors' suits, skirts, and coats
- 2338 Women's, misses' and juniors', outerwear, n.e.c.*
- 2341 Women's, misses', children's and infants' underwear and nightwear
- 2342 Brassieres, girdles and allied garments
- 2353 Hats, caps and millinery
- 2361 Girls', children's and infants' dresses, blouses and shirts
- 2369 Girls', children's and infants' outerwear, n.e.c.*
- 2371 Furgoods
- 2381 Dress and work gloves, except knit and all leather
- 2384 Robes and dressing gowns
- 2385 Waterproof outerwear
- 2386 Leather and sheep lined clothing
- 2387 Apparel belts
- 2389 Apparel and accessories, n.e.c.*
- 2391 Curtains and draperies
- 2392 House furnishings, except curtains and draperies
- 2393 Textile bags
- 2394 Canvas and related products
- 2395 Pleating, decorative and novelty stitching and tucking for the trade
- 2396 Automotive trimmings, apparel findings and related products
- 2397 Schiffli machine embroideries
- 2399 Fabricated textile products, n.e.c.*

24 Lumber and Wood Products, Except Furniture

- 2411 Logging
- 2421 Sawmills and planing mills, general
- 2426 Hardwood dimension and flooring mills
- 2429 Special product sawmills, n.e.c.*
- 2431 Millwork
- 2434 Wood kitchen cabinets
- 2435 Hardwood veneer and plywood
- 2436 Softwood veneer and plywood
- 2439 Structural wood members, n.e.c.*
- 2441 Nailed and lock corner wood boxes and shook
- 2448 Wood pallets and skids
- 2449 Wood containers, n.e.c.*
- 2451 Mobile homes
- 2452 Prefabricated wood buildings and components
- 2491 Wood preserving
- 2493 Reconstituted wood products
- 2499 Wood products, n.e.c.*

25 Furniture and Fixtures

- 2511 Wood household furniture, except upholstered
- 2512 Wood household furniture, upholstered
- 2514 Metal household furniture
- 2515 Mattresses, foundations and convertible beds
- 2517 Wood television, radio, phonograph and sewing machine cabinets
- 2519 Household furniture, n.e.c.*
- 2521 Wood office furniture
- 2522 Office furniture, except wood
- 2531 Public building and related furniture
- 2541 Wood office and store fixtures, partitions, shelving, and lockers
- 2542 Office and store fixtures, partitions, shelving and lockers, except wood
- 2591 Drapery hardware and window blinds and shades
- 2599 Furniture and fixtures, n.e.c.*

26 Paper and Allied Products

- 2611 Pulp mills
- 2621 Paper mills
- 2631 Paperboard mills
- 2652 Setup paperboard boxes
- 2653 Corrugated and solid fiber boxes
- 2655 Fiber cans, tubes, drums and similar products
- 2656 Sanitary food containers, except folding
- 2657 Folding paperboard boxes, including sanitary
- 2671 Packaging paper and plastics film, coated and laminated

- 2672 Coated and laminated paper, n.e.c.*
- 2673 Plastics, foil, and coated paper bags
- 2674 Uncoated paper and multi-wall bags
- 2675 Die-cut paper and paperboard and cardboard
- 2676 Sanitary paper products
- 2677 Envelopes
- 2678 Stationery tablets, and related products
- 2679 Converted paper and paperboard products, n.e.c.*

27 Printing, Publishing and Allied Industries

- 2711 Newspapers: publishing, or publishing and printing
- 2721 Periodicals: publishing, or publishing and printing
- 2731 Books: publishing, or publishing and printing
- 2732 Book printing
- 2741 Miscellaneous publishing
- 2752 Commercial printing, lithographic
- 2754 Commercial printing, gravure
- 2759 Commercial printing, n.e.c.*
- 2761 Manifold business forms
- 2771 Greeting cards
- 2782 Blank books, looseleaf binders and devices
- 2789 Bookbinding and related work
- 2791 Typesetting
- 2796 Plate making and related services

28 Chemicals and Allied Products

- 2812 Alkalies and chlorine
- 2813 Industrial gases
- 2816 Inorganic pigments
- 2819 Industrial inorganic chemicals, n.e.c.*
- 2821 Plastics materials, synthetic resins and non-vulcanizable elastomers
- 2822 Synthetic rubber (vulcanizable elastomers)
- 2823 Cellulosic manmade fibers
- 2823 Manmade organic fibers, except cellulosic
- 2833 Medicinal chemicals and botanical products
- 2834 Pharmaceutical preparations
- 2834 In vitro and in vivo diagnostic substances
- 2836 Biological products, except diagnostic substances
- 2841 Soap and other detergents, except specialty cleaners
- 2842 Specialty cleaning, polishing and sanitation preparations
- 2843 Surface active agents, finishing agents, sulfonated oils and assistants
- 2844 Perfumes, cosmetics and other toilet preparations

- 2851 Paints, varnishes, lacquers, enamels and allied products
- 2861 Gum and wood chemicals
- 2865 Cyclic organic crudes and intermediates and organic dyes and pigments
- 2869 Industrial organic chemicals, n.e.c.*
- 2873 Nitrogenous fertilizers
- 2874 Phosphatic fertilizers
- 2875 Fertilizers, mixing only
- 2879 Pesticides and agricultural chemicals, n.e.c.*
- 2891 Adhesives and sealants
- 2892 Explosives
- 2893 Printing ink
- 2895 Carbon black
- 2899 Chemicals and chemical preparations, n.e.c.*

29 Petroleum Refining and Related Industries

- 2911 Petroleum refining
- 2951 Asphalt paving mixtures and blocks
- 2952 Asphalt felts and coatings
- 2992 Lubricating oils and greases
- 2999 Products of petroleum and coal, n.e.c.*

30 Rubber and Miscellaneous Plastics Products

- 3011 Tires and inner tubes
- 3021 Rubber and plastics footwear
- 3052 Rubber and plastics hose and belting
- 3053 Gaskets, packing, and sealing devices
- 3061 Molded, extruded and lathe cut mechanical rubber products
- 3069 Fabricated rubber products, n.e.c.*
- 3081 Unsupported plastics film and sheet
- 3082 Unsupported plastics profile shapes
- 3083 Laminated plastics plate, sheet and profile shapes
- 3084 Plastics pipe
- 3085 Plastics bottles
- 3086 Plastics foam products
- 3087 Custom compounding of purchased plastics resins
- 3088 Plastics plumbing fixtures
- 3089 Plastics products, n.e.c.*

31 Leather and Leather Products

- 3111 Leather tanning and finishing
- 3131 Boot and shoe cut stock and findings
- 3142 House slippers
- 3143 Men's footwear, except athletic

- 3144 Women's footwear, except athletic
- 3149 Footwear, except rubber, n.e.c.*
- 3151 Leather gloves and mittens
- 3161 Luggage
- 3171 Women's handbags and purses
- 3172 Personal leather goods, except women's handbags and purses
- 3199 Leather goods, n.e.c.*

32 Stone, Clay, Glass and Concrete Products

- 3211 Flat glass
- 3221 Glass containers
- 3241 Cement, hydraulic
- 3251 Brick and structural clay tile
- 3253 Ceramic wall and floor tile
- 3255 Clay refractories
- 3259 Structural clay products, n.e.c.*
- 3261 Vitreous china plumbing fixtures and china and earthenware fittings and bathroom accessories
- 3262 Vitreous china table and kitchen articles
- 3263 Fine earthenware (whiteware) table and kitchen articles
- 3264 Porcelain electrical supplies
- 3269 Pottery products, n.e.c.*
- 3271 Concrete block and brick
- 3272 Concrete products, except block and brick
- 3273 Ready mixed concrete
- 3274 Lime
- 3275 Gypsum products
- 3281 Cut stone and stone products
- 3291 Abrasive products
- 3292 Asbestos products
- 3295 Minerals and earths, ground or otherwise treated
- 3296 Mineral wool
- 3297 Nonclay refractories
- 3299 Nonmetallic mineral products, n.e.c.*

33 Primary Metal Industries

- 3312 Steel works, blast furnaces (including coke ovens), and rolling mill
- 3313 Electrometallurgical products, except steel
- 3315 Steel wire drawing and steel nails and spikes
- 3316 Cold-rolled steel sheet, strip and bars
- 3317 Steel pipe and tubes
- 3321 Gray and ductile iron foundries

- 3322 Malleable iron foundries
- 3324 Steel investment foundries
- 3325 Steel foundries, n.e.c.*
- 3331 Primary smelting and refining of copper
- 3334 Primary production of aluminum
- 3339 Primary smelting and refining of nonferrous metals, except copper and aluminum
- 3341 Secondary smelting and refining of nonferrous metals
- 3351 Rolling, drawing, and extruding of copper
- 3353 Aluminum sheet, plate and foil
- 3354 Aluminum extruded products
- 3355 Aluminum rolling and drawing, n.e.c.*
- 3356 Rolling, drawing and extruding of nonferrous metals, except copper and aluminum
- 3357 Drawing and insulating of nonferrous wire
- 3363 Aluminum die-castings
- 3364 Nonferrous die-castings, except aluminum
- 3365 Aluminum foundries
- 3366 Copper foundries
- 3369 Nonferrous foundries, except aluminum and copper
- 3398 Metal heat treating
- 3399 Primary metal products, n.e.c.*

32 Fabricated Metal Products, except Machinery and Transportation Equipment

- 3411 Metal cans
- 3412 Metal shipping barrels, drums, kegs and pails
- 3421 Cutlery
- 3423 Hand and edge tools, except machine tools and handsaws
- 3425 Handsaws and saw blades
- 3429 Hardware, n.e.c.*
- 3431 Enameled iron and metal sanitary ware
- 3432 Plumbing fixture fittings and trim
- 3433 Heating equipment, except electric and warm air furnaces
- 3441 Fabricated structural metal
- 3442 Metal doors, sash, frames, molding and trim
- 3443 Fabricated plate work (boiler shops)
- 3444 Sheet metal work
- 3446 Architectural and ornamental metal work
- 3448 Prefabricated metal buildings and components
- 3449 Miscellaneous structural metal work
- 3451 Screw machine products
- 3452 Bolts, nuts, screws, rivets and washers
- 3462 Iron and steel forgings
- 3463 Nonferrous forgings
- 3465 Automotive Stampings
- 3468 Crowns and closures
- 3469 Metal stampings, n.e.c.*
- 3471 Electroplating, plating, polishing, anodizing and coloring

- 3479 Coating, engraving and allied services, n.e.c.*
- 3482 Small arms ammunition
- 3483 Ammunition, except for small arms
- 3484 Small arms
- 3489 Ordnance and accessories, n.e.c.*
- 3491 Industrial valves
- 3492 Fluid power valves and hose fittings
- 3493 Steel springs, except wire
- 3494 Valves and pipe fittings, n.e.c.*
- 3495 Wire springs
- 3496 Miscellaneous fabricated wire products
- 3497 Metal foil and leaf
- 3498 Fabricated pipe and pipe fittings
- 3499 Fabricated metal products, n.e.c.*

35 Industrial and Commercial Machinery and Computer Equipment

- 3511 Steam, gas and hydraulic turbines and turbine generator set units
- 3519 Internal combustion engines, n.e.c.*
- 3523 Farm machinery and equipment
- 3524 Lawn and garden tractors and home lawn and garden equipment
- 3531 Construction machinery and equipment
- 3532 Mining machinery and equipment, except oil and gas field machinery and equipment
- 3533 Oil and gas field machinery and equipment
- 3534 Elevators and moving stairways
- 3535 Conveyors and conveying equipment
- 3536 Overhead traveling cranes, hoists and monorail systems
- 3537 Industrial trucks, tractors, trailers and stackers
- 3541 Machine tools, metal cutting types
- 3542 Machine tools, metal forming types
- 3543 Industrial patterns
- 3544 Special dies and tools, die sets, jigs and fixtures and industrial molds
- 3545 Cutting tools, machine tool accessories and machinists' measuring devices
- 3546 Power driven handtools
- 3547 Rolling mill machinery and equipment
- 3548 Electric and gas welding and soldering equipment
- 3549 Metalworking machinery, n.e.c.*
- 3552 Textile machinery
- 3553 Woodworking machinery
- 3554 Paper industries machinery
- 3555 Printing trades machinery and equipment
- 3556 Food products machinery
- 3559 Special industry machinery, n.e.c.*
- 3561 Pumps and pumping equipment
- 3562 Ball and roller bearings

- 3563 Air and gas compressors
- 3564 Industrial and commercial fans and blowers and air purification equipment
- 3565 Packaging equipment
- 3566 Speed changers, industrial high speed drives, and gears
- 3567 Industrial process furnaces and ovens
- 3568 Mechanical power transmission equipment, n.e.c.*
- 3569 General industrial machinery and equipment, n.e.c.*
- 3571 Electronic computers
- 3572 Computer storage devices
- 3575 Computer terminals
- 3577 Computer peripheral equipment, n.e.c.*
- 3578 Calculating and accounting machines, except electronic computers
- 3579 Office machines, n.e.c.*
- 3581 Automatic vending machines
- 3582 Commercial laundry, dry-cleaning and pressing machines
- 3585 Air conditioning and warm air heating equipment and commercial and industrial refrigeration equipment
- 3586 Measuring and dispensing pumps
- 3589 Service industry machinery, n.e.c.*
- 3592 Carburetors, pistons, piston rings and valves
- 3593 Fluid power cylinders and actuators
- 3594 Fluid power pumps and motors
- 3596 Scales and balances, except laboratory
- 3599 Industrial and commercial machinery and equipment, n.e.c.*

36 Electronic and Other Electrical Equipment and Components, except Computer Equipment

- 3612 Power, distribution, and specialty transformers
- 3613 Switchgear and switchboard apparatus
- 3621 Motors and generators
- 3624 Carbon and graphite products
- 3625 Relays and industrial controls
- 3629 Electrical industrial appliances, n.e.c.*
- 3631 Household cooking equipment
- 3632 Household refrigerators and home and farm freezers
- 3633 Household laundry equipment
- 3634 Electrical housewares and fans
- 3635 Household vacuum cleaners
- 3639 Household appliances, n.e.c.*
- 3641 Electric light bulbs and tubes
- 3643 Current carrying wiring devices
- 3644 Noncurrent carrying wiring devices
- 3645 Residential electric lighting fixtures

- 3646 Commercial, industrial and institutional electric lighting fixtures
- 3647 Vehicular lighting equipment
- 3648 Lighting equipment, n.e.c.*
- 3651 Household audio and video equipment
- 3652 Phonograph records and pre-recorded audio tapes and disks
- 3661 Telephone and telegraph apparatus
- 3663 Radio and television broadcasting and communications equipment
- 3669 Communications equipment, n.e.c.*
- 3671 Electron tubes
- 3672 Printed circuit boards
- 3674 Semiconductors and related devices
- 3675 Electronic capacitors
- 3676 Electronic resistors
- 3677 Electronic coils, transformers and other inductors
- 3678 Electronic connectors
- 3679 Electronic components, n.e.c.*
- 3691 Storage batteries
- 3692 Primary batteries, dry and wet
- 3694 Electric equipment for internal combustion engines
- 3695 Magnetic and optical recording media
- 3699 Electrical machinery, equipment and supplies, n.e.c.*

37 Transportation Equipment

- 3711 Motor vehicles and passenger car bodies
- 3713 Truck and bus bodies
- 3714 Motor vehicle parts and accessories
- 3715 Truck trailers
- 3716 Motor homes
- 3721 Aircraft
- 3724 Aircraft engines and engine parts
- 3728 Aircraft parts and auxiliary equipment, n.e.c.*
- 3731 Ship building and repairing
- 3732 Boat building and repairing
- 3743 Railroad equipment
- 3751 Motorcycles, bicycles and parts
- 3761 Guided missiles and space vehicles
- 3764 Guided missile and space vehicle propulsion units and propulsion unit parts
- 3769 Guided missile and space vehicle parts and auxiliary equipment, n.e.c.*
- 3792 Travel trailers and campers
- 3795 Tanks and tank components
- 3799 Transportation equipment, n.e.c.*

38 Measuring, Analyzing and Controlling Instruments; Photographic, Medical and Optical Goods; Watches and Clocks

- 3812 Search, detection, navigation, guidance, aeronautical and nautical systems and instruments
- 3821 Laboratory apparatus and furniture
- 3822 Automatic controls for regulating residential and commercial environments and appliances
- 3823 Industrial instruments for measurement, display, and control of process variables; and related products
- 3824 Totalizing fluid meters and counting devices
- 3825 Instruments for measuring and testing of electricity and electrical signals
- 3826 Laboratory analytical instruments
- 3827 Optical instruments and lenses
- 3829 Measuring and controlling devices, n.e.c.*
- 3841 Surgical and medical instruments and apparatus
- 3842 Orthopedic, prosthetic and surgical appliances and supplies
- 3843 Dental equipment and supplies
- 3844 X-ray apparatus and tubes and related irradiation apparatus
- 3845 Electromedical and electrotherapeutic apparatus
- 3851 Ophthalmic goods
- 3861 Photographic equipment and supplies
- 3873 Watches, clocks, clockwork operated devices, and parts

39 Miscellaneous Manufacturing Industries

- 3911 Jewelry, precious metal
- 3914 Silverware, plated ware and stainless steel ware
- 3915 Jewelers' findings and materials and lapidary work
- 3931 Musical instruments
- 3942 Dolls and stuffed toys
- 3944 Games, toys and children's vehicles; except dolls and bicycles
- 3949 Sporting and athletic goods, n.e.c.*
- 3951 Pens, mechanical pencils and parts
- 3952 Lead pencils, crayons and artists' materials
- 3953 Marking devices
- 3955 Carbon paper and inked ribbons
- 3961 Costume jewelry and costume novelties, except precious metal
- 3965 Fasteners, buttons, needles and pins

- 3991 Brooms and brushes
- 3993 Signs and advertising specialties
- 3995 Burial caskets
- 3996 Linoleum, asphalted-felt-base and other hard surface floor coverings, n.e.c.*
- 3999 Manufacturing industries, n.e.c.*

49 Electric, Gas and Sanitary Services (limited to 4911, 4931, 4939 and 4953)

- 4911 Electric Services (limited to facilities that combust coal or oil for the purpose of generating electricity for distribution in commerce)
- 4931 Electric and Other Services Combined (limited to facilities that combust coal or oil for the purpose of generating electricity for distribution in commerce)

- 4939 Combination utilities, Not Elsewhere Classified (limited to facilities that combust coal or oil for the purpose of generating electricity for distribution in commerce)
- 4953 Refuse Systems (limited to facilities regulated under the RCRA Subtitle C, 42 U.S.C. section 6921 *et seq.*)

51 Wholesale Trade-Nondurable Goods (limited to 5169 and 5171)

- 5169 Chemical and Allied Products, Not Elsewhere Classified
- 5171 Petroleum Terminals and Bulk Stations

73 Business Services (limited to 7389)

- 7389 Business Services, Not Elsewhere Classified (limited to facilities primarily engaged in solvents recovery services on a contract or fee basis)

APPENDIX C

CHEMICAL RELEASES SORTED IN DESCENDING ORDER FOR REPORTING YEAR 1997

Appendix C

CHEMICAL RELEASES SORTED IN DESCENDING ORDER FOR REPORTING YEAR 1997

Chemical Name	On-Site Releases				Off-Site Transfers	
	Air	Land	Water	Total Releases	POTW	Total Transfers
Methonal	10,012,705	5	8,077	10,020,787	610,069	11,028,806
Zinc Compounds	184,450	7,431,340	553	7,616,343	5,451	8,378,118
Zinc (Fume Or Dust)	15,297	6,795,600	7	6,810,904	119	85,864
Xylene (Mixed Isomers)	4,362,721	0	0	4,362,721	1,364	5,267,797
Lead	48,144	3,443,195	336	3,491,675	29	712,523
Nitrate Compounds	736	755	2,680,722	2,682,213	244,229	261,691
Toluene	1,994,611	911	48	1,995,570	27,917	11,744,257
N-Hexane	1,907,774	0	0	1,907,774	1,188	69,967
Certain Glycol Ethers	1,828,298	6,799	5	1,835,102	92,551	878,412
Methyl Ethyl Ketone	1,834,323	0	110	1,834,433	20	3,057,843
Ammonia	928,103	180,651	562,760	1,671,514	2,048,866	60,582
Lead Compounds	260,371	1,214,561	942	1,475,874	2,180	21,012,339
Styrene	1,203,039	33,885	0	1,236,924	5	239,567
Methyl Isobutyl Ketone	1,142,052	5	5	1,142,062	2,560	1,317,667
1-Chloro-1,1-Difluoroethane	921,500	0	0	921,500	0	0
Hydrochloric Acid	908,750	5	0	908,755	5	0
Ethylbenzene	732,428	0	0	732,428	524	779,625
N-Butyl Alcohol	723,116	0	0	723,116	29,263	181,777
Trichloroethylene	622,863	0	0	622,863	13	367,193
Copper	47,800	571,477	605	619,882	3,253	17,818,108
Hydrogen Fluoride	614,614	0	0	614,614	0	11,000
Chloroethane	439,400	0	0	439,400	0	0

1,2,4-Trimethylbenzene	401,080	5	5	401,090	20	83,897
Dichloromethane	392,927	5	120	393,052	4,963	308,456
Formaldehyde	267,650	5	1,121	268,776	27,900	23,589
Copper Compounds	14,630	234,504	861	249,995	11,290	1,329,212
Sulfuric Acid	212,104	5	0	212,109	0	0
1,1-Dichloro-1-Fluoroethane	186,300	0	0	186,300	0	0
Chlorine	125,835	0	16,000	141,835	250	0
Aluminum (Fume Or Dust)	127,962	0	250	128,212	250	3,041,129
N-Methyl-2-Pyrrolidone	112,390	5	5	112,400	70,926	195,018
Chlorodifluoromethane	108,465	0	0	108,465	0	500
Tetrachloroethylene	102,283	0	0	102,283	0	219,954
Chloroform	96,094	0	0	96,094	3,174	246,254
Polycyclic Aromatic Compounds	84,317	0	0	84,317	0	0
Phosphoric Acid	34,102	33,202	1,000	68,304	47,447	74,522
Nitric Acid	26,481	5	38,255	64,741	11,245	366,173
Phenol	64,073	0	0	64,073	609	111,604
1,2-Dichloroethane	59,619	5	15	59,639	0	16,999
Maleic Anhydride	55,471	0	0	55,471	0	5,094
Barium Compounds	582	50,586	0	51,168	241	14,135
Nickel	8,374	35,471	269	44,114	2,001	784,762
O-Xylene	41,700	5	5	41,710	0	0
1,1,1-Trichloroethane	40,285	0	0	40,285	0	22,415
Bromomethane	39,446	0	0	39,446	0	0
1,1,2-Trichloroethane	37,558	0	0	37,558	646	2,203,334
Ozone	33,612	0	0	33,612	0	0
Cyclohexane	32,387	0	0	32,387	0	132,188
Cresol (Mixed Isomers)	31,910	0	0	31,910	250	164,460
Manganese	24,444	6,357	1,005	31,806	585	1,026,473

Chloromethane	29,618	9	0	29,627	0	0
Ethylene Glycol	27,462	950	1,055	29,467	106,524	63,218
Diisocyanates	27,697	0	0	27,697	0	183,803
Nickel Compounds	5,031	20,967	635	26,633	2,249	444,179
Di(2-Ethylhexyl) Phthalate	3,543	22,499	0	26,042	267	129,963
Chromium	21,465	3,026	255	24,746	655	1,571,028
Cadmium Compounds	16,858	6,622	23	23,503	49	0
Manganese Compounds	17,048	4,264	0	21,312	55,210	1,096,727
Antimony Compounds	1,055	19,210	258	20,523	0	416,636
Arsenic Compounds	610	15,569	271	16,450	14	18,430
Nitroglycerin	1	0	15,622	15,623	0	0
Antimony	352	13,479	9	13,840	743	30,554
Isopropyl Alcohol (Mfg., Strong-Acid Process Only, No Supply	13,339	0	0	13,339	0	352,735
Chromium Compounds	4,493	7,846	117	12,456	1,630	417,685
Acetophenone	10,255	0	0	10,255	0	0
Cumene	9,952	0	0	9,952	0	437
2,4-Dimethylphenol	8,650	0	0	8,650	255	41,960
Formic Acid	7,535	0	0	7,535	0	0
Methyl Tert-Butyl Ether	7,007	0	0	7,007	0	26
Cadmium	345	6,411	2	6,758	0	0
Ethylene Oxide	6,355	0	0	6,355	1	0
Creosote	5,525	0	565	6,090	2,812	72,542
Arsenic	16	5,860	2	5,878	0	0
Triethylamine	5,410	0	0	5,410	0	13,500
Methyl Methacrylate	5,336	0	0	5,336	0	3,261
M-Cresol	5,080	0	0	5,080	5	4,875
2-Methoxyethanol	3,930	0	0	3,930	0	65,501
Malathion	3,850	0	0	3,850	0	1,900

2,4-D 2-Ethylhexyl Ester	3,601	0	0	3,601	0	8,810
P-Cresol	2,920	0	0	2,920	5	3,225
Polychlorinated Biphenyls	0	2,794	0	2,794	0	2,794
Diethanolamine	2,615	5	0	2,620	250	75
3-Iodo-2-Propynyl Butylcarbamate	2,600	0	0	2,600	0	0
Carbaryl	505	1,762	0	2,267	250	7,028
Propylene Oxide	2,065	0	0	2,065	0	0
Dimethylamine	2,029	0	0	2,029	0	0
N,N-Dimethylformamide	1,981	0	0	1,981	4,475	35,051
Phthalic Anhydride	1,946	0	0	1,946	677,233	5,707
Toluene Diisocyanate (Mixed Isomers)	1,811	5	0	1,816	0	28,780
Dicyclopentadiene	1,755	0	0	1,755	0	3,273
Naphthalene	1,724	5	5	1,734	0	3,045
Sec-Butyl Alcohol	1,688	5	0	1,693	5	2,850
S,S,S-Tributyltrithiophosphate	1,611	0	2	1,613	0	111
1,4-Dichlorobenzene	1,588	0	0	1,588	0	1,713
Benzene	1,444	0	0	1,444	0	9
Bromoxynil Octanoate	1,386	0	0	1,386	0	167
Pendimethalin	1,020	5	42	1,067	0	1,400
Hydrazine	1,003	0	0	1,003	0	0
Thiodicarb	750	250	0	1,000	250	1,000
Tert-Butyl Alcohol	970	0	0	970	0	1,337
Atrazine	583	0	0	583	220	6,357
Vinyl Chloride	550	0	0	550	0	0
Acetonitrile	520	0	0	520	54	99,301
2,4-D	511	0	3	514	0	7,829
2,4-D Butoxyethyl Ester	500	0	0	500	0	0

Epichlorohydrin	500	0	0	500	0	750
Bis(2-Chloroethyl) Ether	478	0	3	481	0	4,427
Freon 113	470	0	0	470	0	0
Carbon Disulfide	446	0	0	446	0	0
Vinyl Acetate	414	0	0	414	0	222,242
Cobalt Compounds	107	250	25	382	0	0
Cyanide Compounds	255	5	5	265	19	23,373
Dibutyl Phthalate	262	0	0	262	5	620
4,4'-Methylenedianiline	260	0	0	260	0	773
1,4-Dioxane	255	0	0	255	0	0
Cobalt	255	0	0	255	0	1,250
Propylene	255	0	0	255	0	0
Tetracycline Hydrochloride	219	0	0	219	837	1,735
Trifluralin	163	5	5	173	0	10,225
Merphos	169	0	0	169	0	0
Acetaldehyde	160	0	0	160	0	0
Metribuzin	95	0	24	119	0	1,595
Thiophanate-Methyl	106	0	0	106	0	2,538
Decabromodiphenyl Oxide	100	0	0	100	750	500
Aluminum Oxide (Fibrous Forms)	97	0	0	97	0	19,233
Sodium Nitrite	73	0	0	73	58,122	28,707
Chlorobenzene	68	0	0	68	0	85,417
Dimethyl Chlorothiophosphate	59	0	0	59	0	0
Cyanazine	40	0	0	40	5	36,125
Fluometuron	27	0	0	27	260	11,250
Pentachlorophenol	15	0	8	23	5	17
Acifluorfen, Sodium Salt	5	5	3	13	0	0
Prometryn	13	0	0	13	0	580

1,2-Dichlorobenzene	10	0	0	10	0	0
2-Ethoxyethanol	10	0	0	10	0	0
2-Phenylphenol	10	0	0	10	750	276
Biphenyl	10	0	0	10	0	0
Diglycidyl Resorcinol Ether	10	0	0	10	0	500
Dimethyl Phthalate	10	0	0	10	0	0
Ethyl Chloroformate	10	0	0	10	0	0
Phenanthrene	10	0	0	10	0	0
Pyridine	10	0	0	10	0	0
Toluene-2,4-Diisocyanate	9	0	0	9	0	1,505
Propachlor	8	0	0	8	38	3,410
N,N-Dimethylaniline	7	0	0	7	0	25,760
Quintozone	2	0	0	2	0	1,100
Toluene-2,6-Diisocyanate	2	0	0	2	0	376
Diazinon	1	0	0	1	0	3,503
2,4-Db	0	0	0	0	0	0
2,4-Dichlorophenol	0	0	0	0	0	0
2-Methylactonitrile	0	0	0	0	0	0
4,4'-Isopropylidenediphenol	0	0	0	0	0	0
Acephate	0	0	0	0	0	0
Acrylamide	0	0	0	0	0	0
Anthracene	0	0	0	0	0	0
Barium	0	0	0	0	0	0
Benzoyl Peroxide	0	0	0	0	1,188	650
Beryllium	0	0	0	0	0	0
Bromine	0	0	0	0	3,122,402	281,925
Butyl Acrylate	0	0	0	0	0	0
Captan	0	0	0	0	0	0

Chloroacetic Acid	0	0	0	0	0	0
Chloropicrin	0	0	0	0	0	0
Chlorothalonil	0	0	0	0	0	1,090
Chlorpyrifos Methyl	0	0	0	0	0	0
Cyclohexanol	0	0	0	0	0	0
Cyfluthrin	0	0	0	0	0	0
D-Trans-Allethrin	0	0	0	0	0	0
Dazomet	0	0	0	0	0	0
Dibenzofuran	0	0	0	0	0	0
Dimethyl Sulfate	0	0	0	0	0	0
Disodium Cyanodithioimidocarbonate	0	0	0	0	0	0
Diuron	0	0	0	0	0	0
Famphur	0	0	0	0	0	2,664
Fluazifop Butyl	0	0	0	0	0	0
Hexachloroethane	0	0	0	0	0	0
Isofenphos	0	0	0	0	0	0
Metham Sodium	0	0	0	0	0	147
Methoxone	0	0	0	0	0	0
Myclobutanil	0	0	0	0	0	0
O-Cresol	0	0	0	0	0	0
Peracetic Acid	0	0	0	0	0	0
Permethrin	0	0	0	0	0	590
Phenothrin	0	0	0	0	0	0
Phosphorus (Yellow Or White)	0	0	0	0	500	344
Piperonyl Butoxide	0	0	0	0	0	0
Potassium Dimethyldithiocarbamate	0	0	0	0	0	5
Potassium N-	0	0	0	0	0	0

Methyldithiocarbamate						
Propiconazole	0	0	0	0	0	30,147
Propoxur	0	0	0	0	0	0
Resmethrin	0	0	0	0	0	0
Sethoxydim	0	0	0	0	0	0
Silver	0	0	0	0	0	14,000
Simazine	0	0	0	0	0	0
Sodium Dicamba	0	0	0	0	0	0
Sodium Dimethyldithiocarbamate	0	0	0	0	250	20,600
Tetramethrin	0	0	0	0	0	0
Thiram	0	0	0	0	0	2,315
Triadimefon	0	0	0	0	0	0
Trichlorfon	0	0	0	0	0	0
Triforine	0	0	0	0	0	0
Totals	33,788,155	20,171,157	3,332,020	57,291,332	7,289,690	99,634,390

APPENDIX D

COMMON USES OF TOXIC CHEMICALS AND THEIR POTENTIAL HAZARDS

Appendix D

COMMON USES OF TOXIC CHEMICALS AND THEIR POTENTIAL HAZARDS

The following information is presented as a quick-reference summary of information for some of the toxic chemicals that are reported by TRI facilities. It is not a detailed discussion of the uses or potential hazards posed by the chemicals. This information is from *Hazardous Substance Fact Sheets* provided by the New Jersey Department of Health and distributed by the Environmental Protection Agency, Computer Aided Management of Emergency Operations (CAMEO) and from *A Comprehensive Guide to the Hazardous Properties of Chemical Substances* by Dr. Pradyot Patnaik. The reader should consult chemicals or toxicology reference materials to learn more about the substances presented in this summary. Compiled by the Minnesota Emergency Response Commission.

Acetaldehyde: Used as a liquid in making acetic acid, pyridine, pentaerythritol, peracetic acid and related chemicals. It occurs naturally in ripe fruit, coffee and cigarette smoke.

Hazard: Inhalation can irritate respiratory system, affect the cardiovascular system; liquid or vapor irritates skin and eyes.

Aluminum (Fume or Dust): Used as a powder in paints and protective coatings, as a catalyst and in rocket fuel.

Hazard: Fine powders form flammable and explosive mixtures in air and with powerful oxidants; moderately flammable by heat, flame or chemical reaction with oxidizers.

Ammonia: Used in making fertilizers, explosives, plastics, dyes and textiles.

Hazard: Moderately flammable; inhalation may irritate lungs; can irritate nose eyes, mouth and throat; exposure to concentrated fumes can be fatal.

n-Butyl Alcohol: Liquid used as a solvent for fats, waxes, shellacs, resins, gums and varnishes.

Hazard: Flammable liquid and fire hazard; can damage liver, kidneys, hearing and sense of balance; can cause eye irritation and headaches, irritation to nose and throat may occur.

Carbon Disulfide: Liquid used to make rayon, agricultural fumigants, rubber chemicals and cellulose; clean metal surfaces and extract olive oil.

Hazard: Adversely effects the nervous system; dizziness, headaches, blurred vision, agitation, convulsions, coma and death; vapor irritates the nose and throat; liquid causes chemical burns, damage to eyes.

Chloroform: Used as a cleansing agent, manufacture of refrigerant and fire extinguishers.

Hazard: Dizziness, light-headedness, dullness, hallucination, nausea, headache, fatigue and anesthesia.

Copper and Compounds: Used in electrical wiring, plumbing, compounds used in fumigants, pesticides, electroplating, paint pigments and catalysts.

Hazard: Irritants; some compounds highly toxic; degree of toxicity dependent on compound, exposure and method of entry into the body.

Di (2-ethylhexyl) phthalate: Used to make plastics, products found in homes, automobiles, medical and packaging industries.

Hazard: It is a carcinogen and teratogen; short term exposure may cause irritation to eyes, nose and throat; long term exposure may cause liver cancer; may damage testes, kidneys and liver; may cause numbness and tingling in the arms and legs.

Dichloromethane: Industrial solvent and paint stripper; in aerosol and pesticide products; used in photographic film productions and in food, furniture and plastics processing.

Hazard: Carcinogen; lung irritant; inhalation can cause headaches, fatigue and drunk behavior.

Ethyl Benzene: A solvent, intermediate in the production of styrene.

Hazard: Moderately toxic by inhalation and intraperitoneal routes; an eye and skin irritant.

Ethylene Benzene: In anti-freeze, paints, laminates, auto brake fluids, ink, tobacco and wood stains and used to de-ice aircraft wings.

Hazard: Teratogen; highly toxic by ingestion or inhalation.

Formaldehyde: Used in manufacture of phenolic resins, cellulose esters, artificial silks, dyes, explosives and organic chemicals; also germicide, fungicide and disinfectant; in tanning, adhesives, waterproofing fabrics, and tonic and chrome printing in photography.

Hazard: Can injure eyes, skin and respiratory system; is a mutagen, teratogen and probably carcinogenic.

Glycol Ethers: Solvents.

Hazard: Toxic by inhalation, ingestion or skin absorption; irritating to eyes, nose, throat and skin.

Hexane: Chief constituent of petroleum ether, gasoline and rubber solvent; also solvent for adhesives, vegetable oils, in organic analysis; and denaturing alcohols.

Hazard: May produce distorted vision, hallucination, headache, dizziness, nausea and irritation of eyes and throat.

Hydrochloric Acid: Metal cleaning and pickling, food processing and general cleaners.

Hazard: Very corrosive, toxic by ingestion or inhalation; can irritate mouth, nose and throat.

Hydrogen Fluoride: Used as a catalyst in petroleum industry, fluorination process in aluminum industry, make fluorides, separation of uranium isotopes, making plastics and production of dyes.

Hazard: Is corrosive; can irritate nose, throat and lungs, can cause pulmonary edema, can cause severe burns to skin and eyes; may damage kidneys and liver.

Lead and Compounds: In batteries, gasoline additives, ammunition, piping and radiation shielding.

Hazard: Poison by ingestion, can cause brain damage, particularly in children; suspected carcinogen of the lungs and kidneys.

Manganese and Compounds: Used in aluminum production, steel making and dry cell batteries, compounds used for varnishes, fertilizers and food additives.

Hazard: Dust is flammable and moderately explosive; toxic by inhalation.

Methanol: Solvent, cleaner and fuel.

Hazard: Highly flammable, ingestion can cause blindness; has a mild toxicity by inhalation.

Methyl Ethyl Ketone: Solvent in making plastics, textiles, paint removers and adhesives.

Hazard: flammable, explosive; toxic by inhalation; a strong irritant; has a moderate toxicity by ingestion.

Methyl Isobutyl Ketone: Solvent for paints, varnishes, nitrocellulose lacquers, gun and resins.

Hazard: Flammable, poison by intraperitoneal route, has a moderate toxicity by ingestion or inhalation; very irritating to eyes, skin and mucous membranes; narcotic in high concentrations.

Nickel and Compounds: Used in alloys and electroplating, catalysts, dyes and textile printing.

Hazard: Carcinogenic and poisonous.

Nitrate Compounds: Accelerates the burning of combustible materials; if involved in a fire an explosion may result, may react violently with fuels.

Hazard: May cause burns to skin and eyes; may produce irritating or poisonous gasses.

Nitric Acid: Used in making fertilizers, dyes, explosives, metallurgy and etching steel.

Hazard: Corrosive, powerful oxidizer; flammable by chemical reaction with reducing agent; produces toxic fumes when heated to decomposition; corrosive to eyes, skin, mucous membranes and teeth; experimental teratogen; delays pulmonary edema.

Styrene: Used in the manufacture of polystyrene, resins, protective coatings, plastics, synthetic rubber and an insulator.

Hazard: Toxic by ingestion and inhalation; can react vigorously with oxidizing agents; emits acrid smoke and irritating fumes when heated to decomposition.

Sulfuric Acid: In fertilizers, chemicals, dyes, rayon and film; widely used by metals industry.

Hazard: Moderately toxic by ingestion; a severe eye irritant, extremely irritating, corrosive and toxic to tissue.

Tetrachloroethylene: Used as a solvent, in dry-cleaning and metal degreasing.

Hazard: Can produce headaches, dizziness, drowsiness, incoordination, irritation to eyes, nose and throat; flushing of neck and face.

Toluene: Solvent for perfumes, medicines, dyes, explosives, detergents, aviation gasoline and other chemicals.

Hazard: Highly flammable and explosive; toxic by ingestion, inhalation and skin contact.

1,1,1-Trichloroethane: Solvent for cleaning precision instruments; also in pesticides and textiles.

Hazard: Suspected carcinogen, irritating to eyes and skin; has a mild toxicity by ingestion, inhalation and skin contact.

Trichloroethylene: Cleaning electronic parts and diluting paints; also in degreasers and fumigants; aerospace industries use it to flush liquid oxygen.

Hazard: Carcinogenic, has a mild toxicity by ingestion and inhalation.

1,2,4-Trimethyl Benzene: Used in the manufacture of dyes and pharmaceuticals.

Hazard: Moderately toxic by intraperitoneal route; mildly toxic by inhalation; can cause nervous system depression, anemia and bronchitis; flammable when exposed to heat, flame or oxidizers.

Xylene: Used as solvents and in making drugs, dyes, insecticides and gasoline.

Hazard: Flammable, mildly toxic by ingestion and inhalation.

Zinc and Compounds: Used as a coating on iron and steel, in making brass metal alloys, car parts, electroplating, batteries, electrical products, paints and fumigants.

Hazard: Zinc dust is flammable and a human skin irritant.

APPENDIX E

COMPANIES SHOWING LARGEST REDUCTIONS OF ON-SITE RELEASES, 1998 THROUGH 1997

Appendix E

COMPANIES SHOWING LARGEST REDUCTIONS OF ON-SITE RELEASES

1998 Through 1997*

Company	City	1988 Releases	Start Year	1997 Releases	End Year	Decrease (pounds)	% Reduction
3M	Columbia	542,850		18,600		524,250	96.6%
3M	Nevada	3,765,342		922,115		2,843,227	75.5%
3M	Springfield	766,383		404,988		361,395	47.2%
AB Chance	Centralia	175,200		596		174,604	99.7%
ABB Power	St. Louis	63,000		0		63,000	100.0%
ABB Power	Jefferson City	197,450		52,320	1995	145,130	73.5%
Alco Controls	St. Louis	112,600		5		112,595	100.0%
AlliedSignal	Nevada	57,700		0		57,700	100.0%
AP Green	Mexico	1,441,691		18,800		1,422,891	98.7%
AP Green	Fulton	65,180		1,658		63,522	97.5%
AT&T	Lee's Summit	1,293,209		12,300	1995	1,280,909	99.0%
Bayer Corp.	Kansas City	235,982		61,092		174,890	74.1%
Binkley Co.	Warrenton	106,500		86,576		19,924	18.7%
Borden Pkg.	St. Louis	772,600		469,296		303,304	39.3%
Briggs & Stratton Corp.	Poplar Bluff	261,066	1991	19,536		241,530	92.5%
Butterball Turkey Co.	Carthage	315,415	1992	94,087		221,328	70.2%
BW Freeman	Owensville - Cuba	147,388		180		147,208	99.9%
Canon Steel Corp.	Washington	717,329		0		717,329	100.0%
Chrysler Corp.	Fenton (Plt#1)	2,837,403		475,198		2,362,205	83.3%
Chrysler Corp.	Fenton (PLt#2)	1,371,329		405,642	1995	965,687	70.4%
Cook Composites & Polymers	N Kansas City	424,048	1989	21,710		402,338	94.9%
Crane National Vendors	Bridgeton	317,650		0		317,650	100.0%
Dayco Products	Springfield	616,250		54,768		561,482	91.1%
Dennis Chemical	St. Louis	17,750		5		17,745	100.0%
Doe Run Co.	Boss	131,400		39,531		91,869	69.9%
Doe Run Co.	Herculaneum	28,878,201		8,729,930		20,148,271	69.8%
Donaldson Co.	Chillicothe	205,526		21,482		184,044	89.5%
Dyno Nobel	Louisiana	1,843,829		874,700		969,129	52.6%
Eagle Pitcher	Joplin	109,500		13,740		95,760	87.5%
Emerson Electric	Kennett	295,369		80,282		215,087	72.8%
Emerson Motor Co.	Ava	265,982		10,246		255,736	96.1%
Eveready Battery	Maryville	113,176		34,410		78,766	69.6%

Fasco Industries Inc.	Ozark	184,171		73,529	1996	110,642	60.1%
Ford Motor Co.	Hazelwood	1,466,950		1,235,451		231,499	15.8%
George's Processing	Butterfield	162,028	1990	86,499		75,529	46.6%
GM Truck Group	Wentzville	1,758,390		866,499		891,891	50.7%
Hussman Corp.	Bridgeton	756,379		31,823		724,556	95.8%
INDRESCO Inc.	Vandalia	393,770		260	1994	393,510	99.9%
James River Paper Co.	Hazelwood	114,431	1989	11,050	1995	103,381	90.3%
KV Pharmaceutical Co.	Brentwood	136,569		7,920	1992	128,649	94.2%
KV Pharmaceutical Co.	Creve Coeur	664,499	1989	113,420		551,079	82.9%
Lay-Z-Boy	Nevada	201,763		32,607		169,156	83.8%
Lever Bros. Co.	Pagedale	101,020		0	1995	101,020	100.0%
Lincoln A. Pentair Co.	St. Louis	195,387		300		195,087	99.8%
Litton Co.	Springfield	310,405		7,000		303,405	97.7%
Mallinckrodt Chemical	St. Louis	728,327		265,777		462,550	63.5%
Marathon Electric	Lebanon	147,443		12,060		135,383	91.8%
Marathon Electric Mfg.	West Plains	171,195		0		171,195	100.0%
Marchem Coated Fabrics	New Haven	530,573		7,617		522,956	98.6%
Marquette Tool & Die Co.	St. Louis	377,000		124,080		252,920	67.1%
Marrion Merrell Dow Inc.	Kansas City	416,991		336	1994	416,655	99.9%
Maverick Tube Corp.	Union	342,784	1989	106,843	1992	235,941	68.8%
McDonnell Douglas Corp.	St. Louis	812,483		224,272		588,211	72.4%
MEMC Electric Materials	O'Fallon	328,312		47,064		281,248	85.7%
Meramec Industries	Sullivan	282,360		0		282,360	100.0%
Mississippi Lime Co.	Ste. Genevieve	262,117		43,000		219,117	83.6%
Modine Heat Transfer	Camdenton	195,586		63,546	1996	132,040	67.5%
Modine Mfg. Co.	Joplin	111,084		25		111,059	100.0%
Monsanto	St. Louis	726,825		8,979	1996	717,846	98.8%
National Refractories	Mexico	471,244		1,901		469,343	99.6%
Nesco Container Corp.	Fenton	218,232		58,900		159,332	73.0%
Norando Aluminum Inc.	New Madrid	1,154,071		622,998		531,073	46.0%
Nordyne Inc.	Boonville	105,350		29,455		75,895	72.0%
North American Refractories	Farber	567,652		15		567,637	100.0%
Olin Corp.	Independence	132,600		86,419	1993	46,181	34.8%
OMC Alum. Boat Group	Lebanon	146,350		88,045		58,305	39.8%

O'Sullivan Industries Inc.	Lamar	248,150		33,869		214,281	86.4%
Parker Hannifin Corp.	Kennett	110,350		5		110,345	100.0%
Reynolds Metals Co.	Kansas City	298,648		166,668		131,980	44.2%
Robertson - Ceco	St. Louis	189,450		0	1994	189,450	100.0%
S & K Industries Inc.	Lexington	89,680		10,284	1995	79,396	88.5%
Siegel-Robert Plating Co.	St. Louis	149,500		19,280		130,220	87.1%
Solid State Circuits Inc.	Springfield	57,350		5,005	1994	52,345	91.3%
Sporlan Valve	Washington	59,726		30,025		29,701	49.7%
Steel Processors	Seymour	104,002		12,000	1995	92,002	88.5%
Sunbeam Outdoor	Neosho	120,883	1990	35,737	1993	85,146	70.4%
Sunbeam Outdoor Products	Neosho	480,280		94,158	1995	386,122	80.4%
Sunnen Products Co.	Maplewood	50,607		16,600		34,007	67.2%
Sweetheart Cup Co.	Springfield	57,532		19,812	1996	37,720	65.6%
Syntex Agribusiness Inc.	Springfield	1,416,412		122,611		1,293,801	91.3%
Toastmaster Inc.	Macon	103,702		47,343		56,359	54.3%
Toastmaster Inc.	Boonville	123,980		64,422		59,558	48.0%
Tracker Marine	Lebanon	81,135		1	1996	81,134	100.0%
Transformer Materials Co.	St. Peters	271,700	1989	158,200		113,500	41.8%
US DOE	Kansas City	687,038		975		686,063	99.9%
Valentec Kisco Inc.	Hillsdale	60,793		0	1993	60,793	100.0%
Wire Rope Corp.	Kansas City	44,250		100		44,150	99.8%
York Casket	Marchfield	199,791	1989	54,870		144,921	72.5%

* If the beginning or ending years are different than 1988 or 1997, the Start and End Year are as noted.

APPENDIX F

TOTAL 1997 TRI RELEASES BY COUNTY

Appendix F

TOTAL 1997 TRI RELEASES BY COUNTY

County	Total Releases Per County (Lbs.)	Percent Of Total
Iron	10,851,280	18.94%
Jefferson	10,674,082	18.63%
St Louis	3,692,317	6.44%
Pike	3,420,273	5.97%
Carter	3,255,696	5.68%
Clay	3,240,258	5.66%
Shannon	2,722,752	4.75%
Jasper	1,983,101	3.46%
St Louis City	1,666,448	2.91%
St Charles	1,620,611	2.83%
Buchanan	1,556,965	2.72%
New Madrid	1,426,887	2.49%
Greene	1,102,031	1.92%
Vernon	922,115	1.61%
Jackson	867,002	1.51%
Audrain	813,080	1.42%
Texas	809,712	1.41%
Cape Girardeau	806,555	1.41%
Dent	640,731	1.12%
Dunklin	625,780	1.09%
Sullivan	539,355	0.94%
Franklin	372,060	0.65%
Pemiscot	341,875	0.60%
St Francois	319,488	0.56%
Perry	297,580	0.52%
Lawrence	211,352	0.37%
Marion	208,670	0.36%
Henry	205,077	0.36%
Boone	166,233	0.29%
Pettis	165,120	0.29%
Barry	162,923	0.28%
Miller	141,275	0.25%
Warren	140,786	0.25%
Laclede	131,580	0.23%
Cooper	125,532	0.22%
Webster	112,120	0.20%
Cole	106,540	0.19%
Holt	79,513	0.14%
Ralls	70,435	0.12%
Polk	68,377	0.12%
Livingston	58,907	0.10%

Newton	57,647	0.10%
Saline	55,911	0.10%
Macon	55,343	0.10%
Ste Genevieve	43,000	0.08%
Stoddard	36,775	0.06%
Nodaway	36,319	0.06%
Butler	35,794	0.06%
Howell	35,079	0.06%
Barton	34,119	0.06%
Carroll	18,000	0.03%
Randolph	18,000	0.03%
Lafayette	17,055	0.03%
Grundy	16,113	0.03%
Osage	16,000	0.03%
Lewis	14,134	0.02%
Daviess	13,713	0.02%
Chariton	10,660	0.02%
Montgomery	9,905	0.02%
Scott	8,834	0.02%
Mc Donald	6,292	0.01%
Crawford	5,852	0.01%
Cass	5,588	0.01%
Johnson	3,660	0.01%
Christian	2,948	0.01%
Washington	2,638	0.00%
Ray	2,520	0.00%
Howard	2,504	0.00%
Callaway	1,658	0.00%
Platte	1,250	0.00%
Shelby	1,019	0.00%
Phelps	505	0.00%
Camden	10	0.00%
Wright	8	0.00%
Ripley	5	0.00%
Adair	0	0.00%
Bates	0	0.00%
Clinton	0	0.00%
Lincoln	0	0.00%
Mercer	0	0.00%
Mississippi	0	0.00%
Moniteau	0	0.00%
Monroe	0	0.00%
Putnam	0	0.00%

Total 1997 Releases

57,291,332

APPENDIX G

SOURCE REDUCTION ACTIVITY CODES

Appendix G

SOURCE REDUCTION ACTIVITY CODES

Good Operating Practices

- W13 Improved maintenance scheduling, record keeping or procedures
- W41 Increased purity of raw materials
- W14 Changed production schedule to minimize equipment and feedstock changeovers
- W19 Other changes in operating practices

Inventory Control

- W21 Instituted procedures to ensure that materials do not stay in inventory beyond shelf-life
- W22 Began to test outdated material – continue to use if still effective
- W23 eliminated shelf-life requirements for stable materials
- W24 Instituted better labeling procedures
- W25 Instituted clearinghouse to exchange materials that would otherwise be discarded
- W29 Other changes in inventory control

Spill and Leak Prevention

- W31 Improved storage or stacking procedures
- W32 Improved procedures for loading, unloading, and transfer operations
- W33 Installed overflow alarms or automatic shut-off valves
- W35 Installed vapor recovery systems
- W36 Implemented inspection or monitoring program of potential spill or leak sources
- W39 Other changes made in spill and leak prevention

Raw Material Modifications

- W42 Substituted raw materials
- W49 Other raw material modifications

Process Modifications

- W51 Instituted recirculation within a process
- W52 Modified equipment, layout or piping
- W53 Use of a different process catalyst
- W54 Instituted better controls on operating bulk containers to minimize discarding of empty containers
- W55 Changed from small volume containers to bulk containers to minimize discarding of empty containers
- W58 Other process modifications

Cleaning and Degreasing

- W59 Modified stripping/cleaning equipment
- W60 Changed to mechanical stripping/cleaning devices (from solvents or other materials)
- W61 Changed to aqueous cleaners (from solvents or other materials)
- W63 Modified containment procedures for cleaning units
- W64 Improved draining procedures
- W65 Redesigned parts racks to reduce drag out

Cleaning and Degreasing (Continued)

- W66 Modified or installed rinse systems
- W67 Improved rinse equipment design
- W68 Improved rinse equipment operation
- W71 Other cleaning and degreasing modifications

Surface Preparation and Finishing

- W72 Modified spray systems or equipment
- W73 Substituted coating materials used

- W74 Improved application techniques
- W75 Changed from spray to other system
- W78 Other surface preparation and finishing modifications

Product Modifications

- W81 Changed product specifications
- W82 Modified design or composition of products
- W83 Modified packaging
- W89 Other product modifications